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THE SURGICAL RELIEF OF PAIN IN DEEP CARCINOMA OF THE FACE AND NECK*

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CARCINOMA involving the structures of the face and neck, though usually without pain, may by deep extension to the nerve trunks or sinuses give rise to intractable suffering which at times is not amenable to even large doses of morphine. For this type of case, surgical solution of continuity of the sensory nerves may bring relief of pain to the sufferer and render anesthetic the involved area, permitting extensive fulguration or deep roentgen therapy without further discomfort.

Pain fibers from the head and neck follow four main pathways to reach the brain stem. Deep carcinoma produces intense pressure pain when the growth occurs near one of the above structures or is confined to a bony sinus. The pain is more or less constant and accentuated by pressure if the growth be palpable. It is now possible surgically to cut these pain tracts close to their points of entry into the central nervous system, well behind the usual extension of the growth.

The fifth nerve is the most important of the pathways as it supplies the greater portion of the face, sinuses, nose, mouth and tongue. If the growth be confined to the area of the fifth nerve or one of its branches, giving rise to pain or demanding regional anesthesia for extensive treatment, two courses lie open to obtain relief: (1) Alcoholic injection of the nerve trunks behind the growth. This applies to the second and third divisions, and may, if successful, produce freedom from pain for from nine months to three years; (2) section of the posterior root of the Gasserian ganglion. This procedure first suggested by Spiller in 1898 and since perfected by Frazier is now the accepted cure for trigeminal neuralgia, an operation which at the present time sustains a mortality of less than 0.5 per cent in this clinic. Permanent anesthesia on the side of the face supplied is obtained by section of the posterior root as regeneration does not take place if the pathways are cut behind the ganglion. This procedure is indicated when the growth is so extensive as to involve more than one division of the fifth nerve or is so situated that injection is unwise, due to distortion of the structures or the possibility of entering the growth with the needle and favoring its extension.

The method and procedure have been fully taken up by Grant[1] in a recent paper on this means of relief. Suffice it to say that the operation is identical with that performed for trigeminal neuralgia, though at times it may be confined to intracranial neurectomy of the divisions involved in front of the ganglion. This latter method is quicker than the posterior root avulsion, but the nerve fiber will regenerate in time should the patient survive a year or more. Neurectomy is therefore advisable only in cases where operative procedures should be confined to the minimum and the outcome of the case prognostically hopeless.

[1] GRANT, F. C. Suggestion for relief for the pain from carcinoma of mouth and cheek. *Ann. Surg.*, February, 1925, lxxxi, 494–498.

* Read at the meeting of the PHILADELPHIA ROENTGEN RAY SOCIETY, April 2, 1925.

It is similar to alcoholic injection in its results.

The next most important groups of nerves to be involved are the upper cervicals. This problem has presented many difficulties until recently because of the many trunks involved, the complexity of the cervical plexus and the deep-lying roots making difficult surgical intervention.

There is a definite portion of the lower face about the angle of the jaw and below

FIG. 1. Patient in whom neurectomy of the second and third divisions of the fifth nerve by the author gave complete relief of pain and offered opportunity for further fulguration in the area of involvement (case from Dr. Grant's series).

the chin as well as the upper neck which is supplied by the cervical nerves, and frequently it has been found that pain persisted even after destruction of the entire fifth nerve on the side involved, the overlap of the cervical nerves being included in the deep extensions behind the jaw.

Direct extension of the growth or metastatic involvement in the region of the cervical plexus gives rise to intense pain referred upover the scalpon the back of the head and to the region of the lower jaw. The solution of this problem seemed to lie in cervical rhizotomy, or the exposing of the upper cervical cord by means of laminectomy and the ligation of the dorsal cervical roots on the side of the lesion as they enter the cord. The following report of such a case, J. D., referred to the author by Dr. Pancoast and Dr. Pendergrass, will illustrate the possibilities of this procedure. As far as the author is able to determine, this is the first case in which rhizotomy has been performed for the relief of pain due to involvement of the deep cervical nerve trunks by carcinoma, and offers a satisfactory solution to a problem which has presented many difficulties in the past.

CASE REPORT

J. D., aged sixty-one. Admitted to the neurosurgical service of the University Hospital, Sept. 24, 1924. Referred by Dr. Eugene P. Pendergrass. *Diagnosis:* Secondary carcinoma, left side, behind the angle of the jaw, with severe occipital pain.

Operation. Cervical rhizotomy, ligation of upper four posterior roots, recovery with complete relief of pain.

Complaint. Pain in the lower half of the face and back of the head, with large mass behind the angle of the jaw on the left side.

History. Patient perfectly well until two years ago when he developed a sore in the roof of his mouth. Fetor oris accompanied this but no pain. Hoarseness of the voice followed shortly after. Local treatments for one year. Pain in the pharynx developed and the patient was referred to Dr. Pancoast for roentgen treatment, which was given, with subsidence of the growth in the mouth. Three months ago he began to have pain in the face and posterior half of the head almost constantly, requiring morphine constantly which helped but did not relieve the suffering. About two months ago, a swelling appeared behind the left sternomastoid muscle. Hoarseness has improved and the general condition seems improved following irradiation and he feels fairly well except for pain. Lost 17 lb. n weight in the last four months.

Physical Examination. Blood pressure 145/85. The patient is a small adult male, in apparently good health. The skin shows numerous areas of pigmentation, due to injuries while working in a coal mine. Mentality good; speech thick due to destruction of left side of hard palate and tongue; pain on the left side of the head and scalp, referred to the midline and

the vertex posteriorly. Eyes; no exophthalmos, no ptosis, nystagmus nor ocular palsy; pupils small, clear, regular and respond to light and accommodation. Ears; unable to hear ticking of watch in either ear; no mastoid tenderness. Nose; negative. Mouth; teeth absent, tongue edematous on the left side and slightly sore; no ulceration but moderate hyperemia. The tonsil and posterior pillar on the left side seem to merge into the swelling which extends into the throat, and is hyperemic, only slightly tender and not ulcerated. The right side of the mouth appears quite normal. Gums are normal, the uvula is absent, the hard palate pale and apparently normal. The nasopharynx is infected. Face and neck; the left side of the neck presents a large glandular swelling behind the angle of the jaw and below and behind the ear. The glands are stony hard and fixed and not tender, or very slightly so. Only the anterior and upper cervical chain is involved.

Chest: Heart negative, lungs clear. Abdomen negative.

Extremities: Upper; numerous coal markings and small scars. Radial pulses equal, synchronous, normal rate, volume and rhythm. Arteries moderately sclerotic and tortuous. Movements normal excepting limitation in extension at elbow joints. Power and sensations normal. Reflexes present but weak in response and equal. Lower; scar of old compound fracture of right tibia. Movements, power and sensation normal. No Kernig, Babinski or clonus; knee jerks present on reinforcement; Achilles jerks would not respond.

Diagnosis: Neuralgia of the occipital nerves, greater and lesser, attending metastatic carcinoma.

8/8/24. (Note by Dr. Grant.) The pain of which this patient complains extends from the back of his neck to just above his eye on the left. Pressure over the mass of glands and over his occipital nerve causes pain. In my opinion, it would be wiser first to remove his greater and lesser occipital nerves before performing any more radical surgery, to see how much good this would accomplish. The suggestion of cutting the cervical posterior nerve roots seems to me to involve too great a hazard. The patient is not a sufficiently good operative risk to attempt rhizotomy as a primary procedure. To my mind, under the circumstances, this should be left as a last resort.

8/8/24. (Note by Dr. Fay.) As the patient feels that his pain is so intense that relief must be obtained, and this distress is the only thing which delays him from returning to work, some procedure is indicated. The approach to the involved nerves through the involved area is unwise in my opinion, and that of Dr. Pendergrass, because the healing of the wound would be uncertain after the amount of roentgen-ray exposure and the added possibility of dissemination of the growth with the subsequent breaking down of the wound. Rhizotomy offers the only other means of relief, and the added risk in this procedure the patient is willing to assume. Under these conditions, the procedure seems indicated and justified.

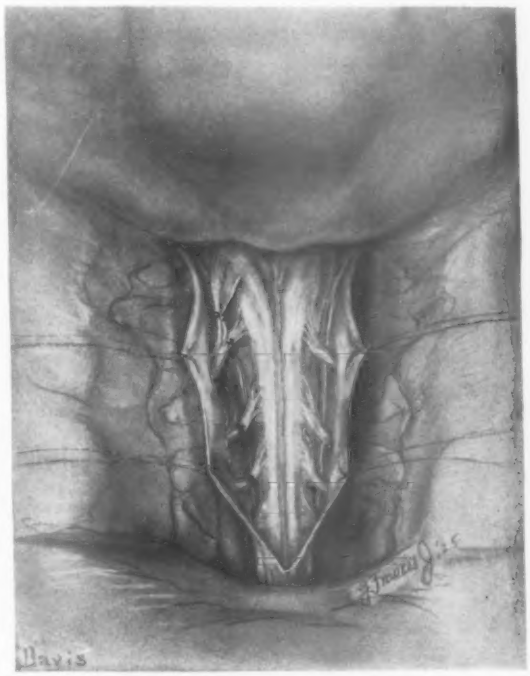

FIG. 2. Ligation of the upper three posterior cervical roots for relief of pain from involvement of the cervical plexus on the left. Author's case.

8/11/24. *Operation by Dr. Fay.* Cervical rhizotomy.

After careful preparation of the field, an incision was made in the midline, under local anesthesia, from the occipital protuberance to the seventh cervical spine. The muscle layers were divided in the midline and spinous processes disclosed. The field was remarkably free of hemorrhage. Because of the contour of the axis, the muscles had to be dissected free from the sides of the spinous processes with the knife. There seemed to be little hemorrhage during this step. The lamina of the atlas, axis, and first and second cervical vertebrae was removed, exposing the underlying dural covering of the cord.

At the completion of this step all bleeding was carefully controlled, so that the field was

dry when the dura was opened. The dorsal roots presented on the left side as follows: The posterior dorsal root on left to first seemed larger than its fellows. It was closely approximated by a smaller filament about the size of a hatpin. The next group appeared to be of four fine filaments which converged to make the first cervical root at the point of exit; having been joined by the two directly above. Below this point there were two more roots composed of three fine filaments each. A silk ligature was passed around the first and second, and one each around the three other groups. This was made possible and easy by the use of a blunt dural needle, without traction on the cord. The roots

FIG. 3. Patient after ligation of the upper three cervical roots on the left showing the area of anesthesia for pain and temperature produced. Complete relief of pain was produced. There was no disturbance of tactile sensation except in the area shown by the cross lines behind the mastoid region. Growth situated just below the left ear. Note scar of operation in midline below the occipital protuberance. Patient was able to do without morphine after three days.

were tied by square knots and the threads closely cut. No hemorrhage of any kind occurred. The field was dry throughout and the dura was closed securely without allowing any blood to enter the canal. Muscle closure by tier sutures, with drainage.

The patient returned to ward in excellent condition. Local anesthesia was used up to the point of incising the dura and then light ether anesthesia was begun, and was perfect in its administration and effect, so that there was no reaction on the part of the patient as the dorsal roots were tied. It was interesting to note the surprising lack of shock in this procedure. The patient's blood pressure did not fall below 120 at any time. Time of operation three hours.

8/12/24. Postoperative condition excellent. Drain removed. Anesthesia zone tested and found present well over the occiput and close behind the ear and for a short distance downward on to the neck. The patient has no pain and morphine has been discontinued.

9/7/24. Wound healing well and quite clean. Dressings to be continued at surgical dispensary. No pain. Discharged. Morale improved, feels perfectly comfortable. To return for subsequent radiation.

Involvement of the ninth nerve is not rare but is frequently difficult of diagnosis. Pain is referred at times to the ear. There is a severe burning or scalding sensation confined to the left palate and the pharynx.

Doyle[1] reports a series of 4 cases of neuralgia involving the ninth nerve with section of the petrosal ganglion in one case. The possibility of ninth nerve section is not new and offers a means of relief to those cases with involvement of this structure. Sicard and Robineau[2] sectioned the ninth nerve at the petrous ganglion with relief of pain in its distribution.

Little has been done toward securing relief of pain due to sympathetic involvement. The localization is not exact and the type of pain is frequently thermal, the patients complaining of burning sensations along the course of the vessels, especially the internal maxillary. Tenderness can be elicited along the carotid and the pain is frequently referred down the neck.

Sluder's syndrome due to involvement of the sphenopalatine ganglion is also of sympathetic character. The pain is frequently felt deep in the eye, radiates backward toward the ear, and down the neck. There is frequently a point of tenderness just behind the mastoid in this condition.

Ablation of the cervical sympathetic trunk, including the superior cervical ganglion, with stripping of the carotid artery, has brought about complete relief of pain in the atypical neuralgias of sympathetic origin in a small series of cases.

[1] DOYLE, J. B. Glossopharyngeal neuralgia. *Arch. Neurol. & Psychiat.*, 1923, ix, 34–46.

[2] SICARD and ROBINEAU. Traitment chirurgical. *Rev. Neurol.*, 1920, xxxvi, 256.

CONCLUSIONS

Avulsion of the posterior root of the fifth nerve has proved of value in relief of pain from deep carcinoma of the face involving the branches of this nerve, as well as rendering anesthetic the involved area, permitting extensive treatment of the growth without discomfort.

Ligation of the posterior roots of the cervical nerves has been successfully performed for involvement of the cervical plexus and cervical roots. Section of the petrous ganglion of the ninth nerve is possible when the invading tumor enters the distribution of this nerve, causing pain, though as yet this procedure has not been undertaken for carcinoma.

Sympathectomy is possible, though no results are yet available for carcinoma, when the vessels or sympathetic ganglion are involved.

ABSTRACT OF DISCUSSION

DR. H. K. PANCOAST, Philadelphia. It is very gratifying to know that there is some procedure which can be depended upon for relief of pain in our hopeless carcinoma cases.

I would like to add one additional operative procedure: On two occasions we have had a cordotomy or section of the anterior-lateral columns of the cord performed for relief of pain in cases of metastatic carcinoma which could not be affected by radiation. This operation can be done without any resulting paralysis, and with complete relief from pain. The operation has been performed by Dr. Frazier, who has carried it out in a number of cases besides the two mentioned.

TERATOID TUMOR OF THE TESTICLE WITH LATE METASTASES IN THE MEDIASTINUM

REPORT OF A CASE*

BY ERNEST A. POHLE, M.D.

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TERATOID tumors of the testicle are characterized by their solid construction, by the absence of highly differentiated cells and by their atypical growth; very often they show cells derived from all three primary blastodermic layers (Wilms[1]). They are very malignant and may metastasize to any part of the body. Radiation either by roentgen rays or radium may have a favorable influence on these tumors, although cure does not often result.[2]

Since tumors of this type are not common, the following case is reported.

CASE REPORT

Male, aged twenty-seven. Mother died of carcinoma of the breast; father, one brother and one sister living and well. Patient had usual diseases of childhood; bronchopneumonia in 1917. In June, 1921, he noticed a slight enlargement of right testicle; no pain nor tenderness. This slowly increased in size until in October it was about as large as a lemon. At that time a puncture was made for hydrocele. The growth became painful and increased considerably in size within a week. In January, 1922, the right testicle was removed; the pathological report was teratoma (Figs. 1 and 2).

On January 25, 1922, the patient received roentgen treatment as follows: 220 kv., 3 ma., 50 cm. focal skin distance, through 1.0 mm. Cu plus 1.0 mm. Al. Port of entry, anterior abdominal wall from the median line outward, and from the navel downward over the groin; 630 ma-min. being administered. Erythema appeared ten days after treatment.

On March 23 the patient received further roentgen treatment over the scar in the scrotum as follows: 135 kv., 25 cm. focal skin distance, through 6 mm. Al and leather, 90 ma-min.

During the first week of April, 1922, a small nodule about the size of a cherry developed

[1] Die teratoiden Geschwulste des Hodens. *Beitr. z. path. Anat. u. z. Allg. Path.*, 1896, xix, 233–366.

[2] Radium Report of the Memorial Hospital, N. Y., 1923, p. 213.

* From the X-Ray Department of Mount Sinai Hospital of Cleveland: Read at the Sixth Annual Meeting, Central Section, AMERICAN ROENTGEN RAY SOCIETY, Detroit, Mich., Feb. 19–21, 1925.

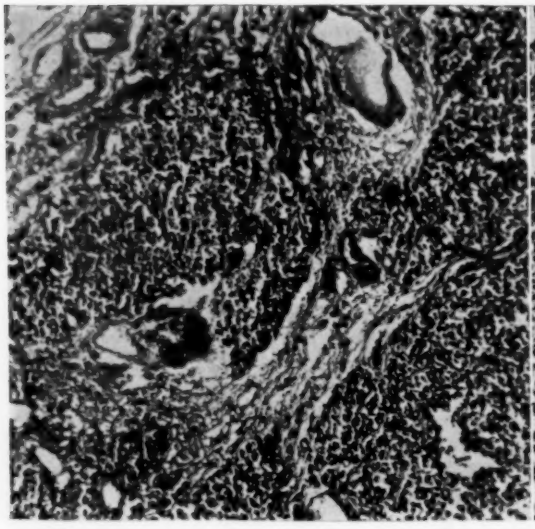

FIG. 1. Photomicrograph of original tumor, showing the alveolar arrangement and invasion (125x).

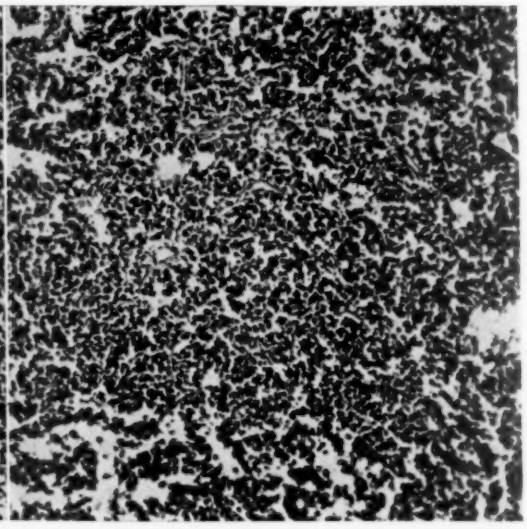

FIG. 2. Photomicrograph of original tumor, showing medium sized round cells with numerous mitoses (125x).

in the scrotum. This was removed at once and a pathological examination made. The diagnosis was recurrence of the teratoid tumor.

FIG. 3. Late reaction on the skin of the abdomen.

A considerable amount of fibrosis developed over the treated area, followed later by telangiectasis. The skin now shows the typical picture of a late reaction after irradiation (Fig. 3).

The patient resumed work in June, 1922, and felt well until March, 1924. At that time he noticed a sharp pain between the scapulae and a dry cough. A roentgen examination of the chest (Fig. 4) showed a tumor mass in the upper mediastinum, which was considered secondary to the growth in the testicle (Dr. E. P. McNamee). The patient was referred to me by Dr. R. Dexter for deep roentgen therapy on April 1, 1924. He was given the following dosage over the area of the tumor: 200 kv., 4 ma., through 1.0 mm. Cu plus 1.0 Al, 50 cm. focal skin distance, 20 by 20 cm. port of entry, front chest, 246 ma-min. On April 2 the same dose was given over the back; on April 3, over the front, and on April 4 over the back. This dose corresponds to 100 per cent H.E.D. on the front and back fields.

The patient was slightly nauseated and felt rather weak for about twenty days. A mild erythema appeared about ten days after the treatments. His blood showed the usual reaction but recovered very well under arsen-iron medication.

The next roentgen examination made on May 5 shows the tumor mass considerably decreased in size (Fig. 5). The roentgen examination on June 5 shows the chest to be practically normal (Fig. 6), and the last examination, on Feb. 6, 1925, shows no evidence of the tumor (Fig. 7).

In July, 1924, the patient resumed his occupation as intern in a hospital, and is in good health.

FIG. 4. Roentgenogram taken on March 25, 1924.

FIG. 5. Roentgenogram taken on May 5, 1924.

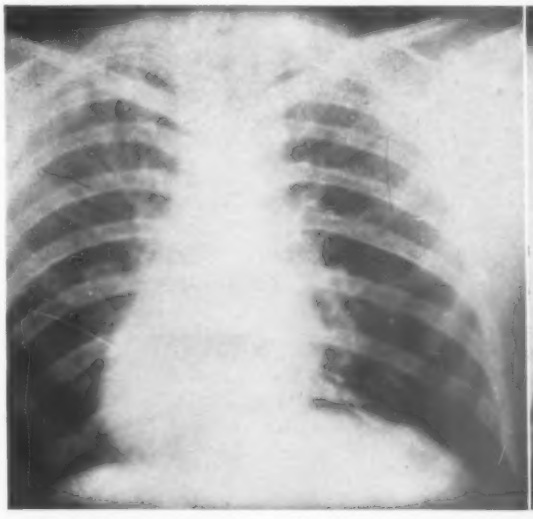

FIG. 6. Roentgenogram taken on June 5, 1924.

FIG. 7. Roentgenogram taken on February 6, 1925.

SUMMARY

A case is reported of a teratoid tumor (embryonal carcinoma) of the testicle treated by surgery and roentgen radiation, with a local recurrence in one month, and metastases to the mediastinum after two years. The secondary growth responded well to deep roentgen therapy and the patient is still well ten months after treatment.

THE TREATMENT OF LUNG AND MEDIASTINAL NEOPLASMS BY HIGH VOLTAGE ROENTGEN THERAPY*

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THE subject of lung and mediastinal neoplasms is of great importance to the radiotherapist for in this field roentgen therapy has no competitor. The question as to whether to operate or to irradiate scarcely ever becomes an issue, and the only question to decide is whether or not the case is too far advanced even to offer any hope from irradiation. The results obtained in the following apparently hopeless cases show that irradiation should be given a trial in every case, no matter how small the chance may appear.

We must keep in mind the fact that without treatment all of these cases terminate fatally, and that radiation is the only treatment to be seriously considered; that even if we cannot always cure these patients we can give them considerable relief, and that occasionally a result is so satisfactory that it not only justifies but demands that these patients be given this only hope of relief.

FIG. 1. Case 1. Large neoplasm involving middle and lower part of left chest.

FIG. 2. Case 1. Taken ten weeks after first series of roentgen treatments. Shows considerable diminution in size of neoplasm.

CASE REPORTS

Case 1. Mrs. J. J., aged fifty-seven, referred by Dr. Harold T. Hyman. Entered Mt. Sinai Hospital on March 15, 1923, with a diagnosis of metastatic carcinoma of the lung.

Past History: Pneumonia when a child; thirteen years ago had cholecystectomy-ovariectomy-myomectomy; two years ago multiple abscesses; one year ago developed goiter; five months ago subtotal thyroidectomy was performed by Dr. Crile.

At the time of admission she still had a small discharging sinus at the site of the thyroid, also a small nodule in the scar tissue. This was removed and found to be carcinomatous. There was flatness over entire left chest.

Roentgen examination at this time showed a neoplasm involving a large part of the left chest (Fig. 1). She has lost 65 lb. within the last eight months. Her main symptoms were cough, dyspnea, marked cyanosis and periodical attacks of coma.

The patient was given the following roentgen treatments:

Series 1. March 24, 26 and 28, 1923; Series 2. June 4, 6 and 8, 1923; Series 3. September 17, 19 and 21, 1923.

At the end of each series there was a decided improvement in the patient's condition, subjectively and objectively, as can be seen from Figures 2 and 3.

The symptoms all improved and gradually disappeared. The patient regained her lost weight and resumed her usual occupation.

* Read at the Sixth Annual Meeting, Eastern Section, AMERICAN ROENTGEN RAY SOCIETY, Atlantic City, N. J., Jan. 22–24, 1925.

The latest roentgenogram (Fig. 4) is practically negative, showing merely some fibrotic thickening of the pleura.

The latest report from this patient was received a short time ago. At that time she had just returned from a trip to Europe and was in excellent health.

Case II. Mr. H. M., aged fifty-seven, referred by Dr. S. Yankauer, January 5, 1924, with diagnosis of neoplasm of the lung. About three months before this date began to complain of severe cough, which has persisted and grown worse. Bronchoscopy showed an extrabronchial neoplasm. Roentgenogram (Fig. 5) shows mass about the size of an egg in left lung.

The patient was given the following roentgen treatments:

Series 1. January 7 and 8, 1924; Series 2. February 26 and 27, 1924; Series 3. May 5 and 12, 1924; Series 4. August 4 and 6, 1924.

FIG. 3. Case I. Taken twelve weeks after second series of roentgen treatments. Shows further diminution in size of neoplasm.

FIG. 4. Case I. Taken ten weeks after third series of roentgen treatments. Practically negative, shows only fibrotic thickening of pleura.

After each series there was a diminution in size of the neoplasm (Figs. 6, 7 and 8) with a corresponding improvement in the patient's general condition.

FIG. 5. Case II. Shows neoplasm about the size of an egg in left lung.

FIG. 6. Case II. Taken six weeks after first series of roentgen treatments. Shows diminution in size of neoplasm.

The latest roentgenogram (Fig. 9) is negative, showing merely a slight thickening of the pleura as the result of the treatment.

I saw this patient a few days ago. His cough has practically disappeared and he is feeling very well.

CASE III. Mrs. R. C., aged twenty-six, referred on Jan. 19, 1923, by Dr. W. M. Brickner. Has been married eight years; has two children aged six years and five weeks,

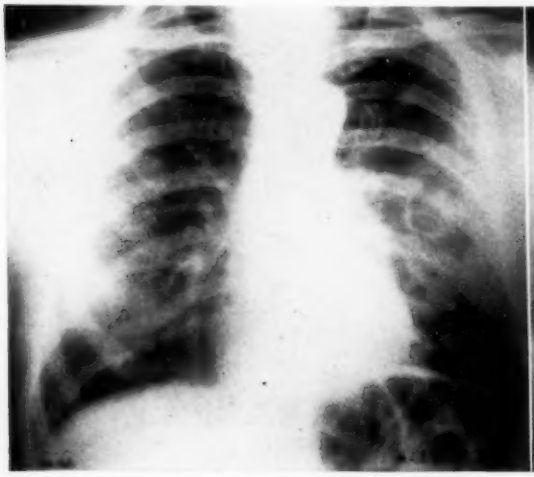

FIG. 7. Case II. Taken eight weeks after second series of roentgen treatments. Shows further diminution in size of neoplasm.

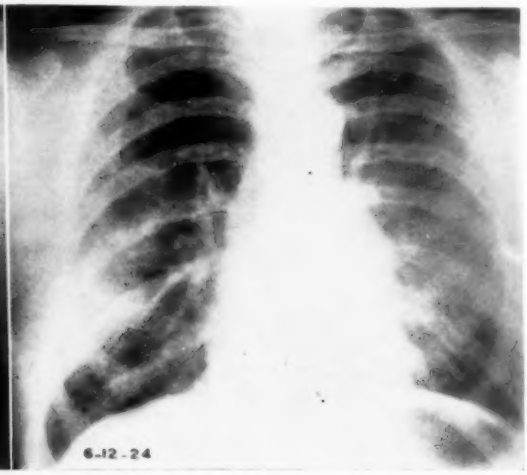

FIG. 8. Case II. Taken five weeks after third series of roentgen treatments. Shows still further diminution in size of neoplasm.

respectively. Three years ago noticed enlargement of the thyroid, followed later by cough and dyspnea. Has lost 20 lb. during the last year. When I saw this patient on Jan. 19, 1923,

FIG. 9. Case II. Taken twelve weeks after fourth series of roentgen treatments. Negative plate; shows only some pleural thickening as the result of treatment.

she was very sick indeed. She had a rather large thyroid, of a very hard consistency, characteristic of a malignant neoplasm. There was flatness over almost the entire chest, and her dyspnea was very severe.

A roentgenogram (Fig. 10) taken in July, 1922, showed a large mediastinal growth of some kind. Another roentgenogram (Fig. 11) taken six months later, a few days before she came to me, showed a decided increase in the size of the neoplasm. While we could not make a definite diagnosis as to the nature of this growth it was suggestive of a lymphosarcoma, or Hodgkin's disease, but I could not explain the nature of the thyroid involvement. It was entirely too hard in consistency for a coincidental adenomatous or cystic enlargement. There were no palpable glands to be found.

Under roentgen treatment there was a marked improvement in the patient's general condition after each series. The roentgenograms (Figs. 12, 13 and 14) show a gradual diminution in the size of the growth. The last roentgenogram taken (Fig. 15) shows a negative condition. The enlargement of the thyroid has entirely disappeared.

I saw this patient a few days ago. She was the picture of health. She has regained her normal weight and volunteered the information that she had never felt better.

CASE IV. Mrs. H. B., aged sixty-nine, referred on Feb. 26, 1924, by the neurological service of the hospital (Dr. I. Strauss), with a diagnosis of myasthenia gravis (thymoma). Her chief symptoms were serious difficulty in chewing, swallowing and talking.

The roentgenograms (Figs. 16 and 17) show an orange-sized shadow extending anteriorly from the right border of the heart. It would be difficult to make a diagnosis as to the nature

of this shadow from these plates. The patient was under observation for some time in the hospital where the diagnosis of myasthenia gravis was made clinically. We felt quite certain that we were dealing with a recurrent lymphorrhagia, this being a characteristic of this disease. Another excised piece taken upon completion of the treatments showed the lymphorrhagia entirely absent. This was considered as a positive proof of cure of this condition.

FIG. 10. Case III. Taken in July, 1922, showing large mediastinal growth.

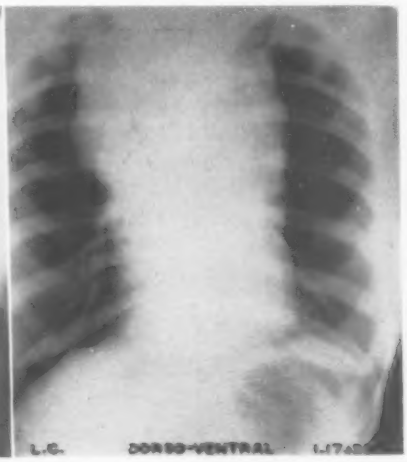

FIG. 11. Case III. Taken in January, 1923, before any roentgen treatments were given. Shows increase in size of growth.

thymus in a rather unusual position. This patient responded to roentgen treatment very promptly. There was a gradual diminution in the size of the shadow (Fig. 18) following each series. The last plate made shows that it has entirely disappeared (Fig. 19). The patient's general condition is much improved. All the symptoms attributed to the recurrent thymus have also disappeared.

The examination of a piece of muscle excised before roentgen treatment showed a state of

The patient had received the following roentgen treatments:

Series 1. Feb. 26, ½ H.E.D. over the chest posteriorly; March 1, ½ H.E.D. over the chest anteriorly.

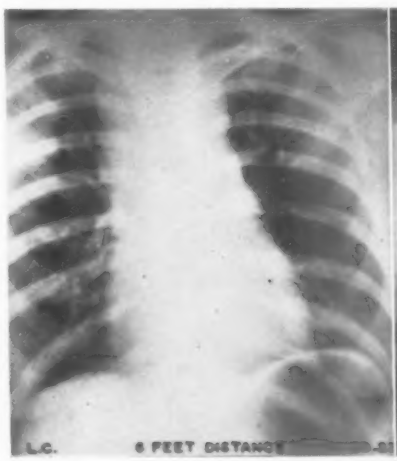

FIG. 12. Case III. Taken three months after roentgen treatments were started. Shows decided diminution in size of growth.

FIG. 13. Case III. Taken nine months after roentgen treatments were started. Shows further diminution.

Series 2. March 25, ½ H.E.D. over the chest posteriorly; March 28, ½ H.E.D. over the chest anteriorly.

Series 3. April 6, ¼ H.E.D. over the chest posteriorly; April 10, ¼ H.E.D. over the chest anteriorly.

CASE V. Mr. M. P., referred on July 9, 1922, by Dr. Howard Lilienthal, with a diagnosis of neoplasm involving entire right chest. This patient has been ill for the past year and a half. His condition had been considered as due to tuberculosis and it was only recently that a diagnosis of neoplasm was made (Fig. 20). He was suffering from extreme dyspnea, cyanosis, cough, weakness, etc. One series of roentgen treatments was given this patient. The roentgenogram taken four weeks later (Fig. 21) shows a very marked improvement. Very shortly after this, however, the patient developed general metastases which terminated fatally.

My object in presenting these roentgenograms is to show the amount of change which may take place in a large neoplasm after even a single intensive radiation.

FIG. 14. Case III. Taken one year after treatments were started. Growth almost entirely disappeared.

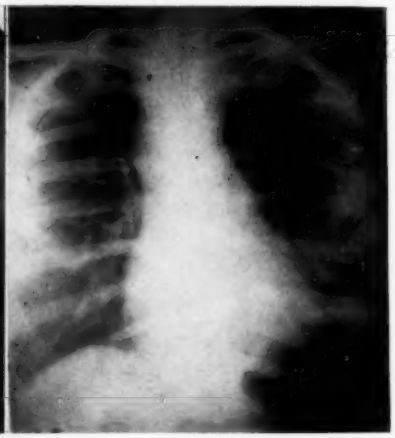

FIG. 15. Case III. Taken nine months later, showing negative plate.

DOSAGE AND TECHNIQUE

In regard to the technique of application of the roentgen ray best adapted to these cases, we may consider two methods, both of which have shown good results:

1. Divide the affected area into two or three fields and administer to each field as large a percentage of an erythema dose as is considered necessary, in as short a time as possible. This is followed by a period of rest, the length of which depends on the size of the dose, the thickness of the

FIG. 16. Case IV. Shows shadow extending anteriorly from right border of heart. Proven to be a thymoma.

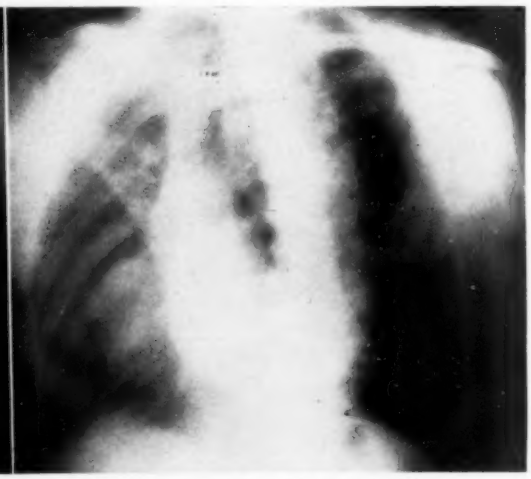

FIG. 17. Case IV. Same as Figure 16; oblique position.

filter, the size of the field, the distance and the degree of reaction following the treatment. Each successive series is given at a longer prolonged interval, with a decreasing dosage. Before each series a roentgenogram should be taken to show what has been accomplished, and also to show the proper time to discontinue the treatments.

2. Divide the series into small fractional units, such as $\frac{1}{5}$ or $\frac{1}{4}$ of an erythema dose and administer this every day or every second day until the series is completed. This method produces less reaction, but is a slower process and is rather trying on ambulatory cases on account of the number of treatments required. For bed-ridden hospital cases who can be wheeled into the treatment room and who cannot stand long exposures, this technique is to be preferred.

FIG. 18. Case IV. Taken seven weeks after roentgen treatments were started. Shows marked diminution in size of shadow.

FIG. 19. Case IV. Taken six months later. Shows complete disappearance of shadow.

FIG. 20. Case V. Large neoplasm involving entire left chest.

FIG. 21. Case V. Taken four weeks after intensive roentgen radiation. Shows marked diminution in size of neoplasm.

These series are also repeated at the end of the proper intervals.

At some of the clinics abroad it is their technique to give these patients very small daily doses, about $\frac{1}{10}$ erythema dose, continuing until the series is completed. The series is never repeated. They believe that if the patient does not respond to the first series further treatment would be of no benefit, and in fact might even result in harm. I cannot endorse this, for our experience shows that often the improvement is a gradual one, showing additional reduction of the lesion following each series.

The dosage and technique to be preferred depends to a large extent upon the nature of the neoplasm. It is often difficult to diagnose the true nature of the growth but often sufficient data are at hand to enable us to make a fairly accurate diagnosis of the character of the lesion. Carcinomas require full doses; sarcomas about 80 per cent dose; lymphosarcomas and Hodgkin's disease much smaller and fractional doses—they should never be treated by massive doses, since they disintegrate so rapidly under radiation that the liberated toxins may cause disastrous results; thymomas are probably best treated by $\frac{1}{2}$ doses.

However, there is no certain technique that is applicable to every case. Each one must be considered from all angles and the knowledge, experience and judgment of the radiotherapist must determine the proper technique of administration.

ROENTGENOTHERAPY AND DIATHERMY IN BLASTOMYCOSIS*

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BLASTOMYCOSIS is a decidedly uncommon disease. The fact that it was not recognized as a definite entity until 1894 and that the list of reported cases is still limited makes it appear rarer perhaps than it actually is. It is probable that many cases have gone, and still go, unrecognized. Since the early communications of Gilchrist, Hyde, Hektoen and Bevan, Montgomery and Ricketts, and Hyde and Ricketts the literature on the subject has become quite extensive.

The disease takes the form of a chronic, slowly but steadily progressive inflammation of the skin; it generally begins as a papule or papulo-pustule, which, becoming covered by a crust, increases in size by peripheral extension, and forms a characteristic patch, with a thickened, papillomatous appearance of irregular shape and elevation. In this thickened, wartlike zone may be seen numerous tiny pustules, which, if broken, exude a yellow, viscid, serous or sero-purulent substance. More or less crusting is present, and if the crusts are removed the marked vascularization of the lesions is shown by a great tendency to bleed. The degree of papillomatous proliferation varies considerably. In some cases it is never pronounced, while in others it is very marked. The appearance of the blastomycotic patch varies according to the thickness of the skin in the region involved. It is on the hand and foot that the papillomatous proliferation assumes its most pronounced form; here the patches are very thick; the apices of the papillae are irregularly flattened, somewhat resembling a mass of slightly dried, pressed tapioca and the area as a whole is a dull red, mottled with pinkish grey. Lesions situated in the groin, where the skin is much thinner, have a deep, dull-red, and granular appearance. The surface is quite moist and glistening, and the papillae are much smaller. Under such conditions the patches seldom become as thick as they do on the hands. One of the outstanding

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features is that the patch or patches are surrounded by deep red, markedly elevated margins giving the impression of a system of earthworks thrown up against the oncoming invasion. Beyond the dyke, built by round-cell infiltration, enclosing the affected territory, separate foci of disease may appear. The centrifugal spread of the disease is not uniform, but quite irregular; indeed, in some instances it follows a rather serpiginous course. As the peripheral zone of fresh lesions extends, the center has a tendency to heal, but the skin is not restored to anything like its normal condition, the healed surface being represented by pinkish, scarlike tissue. Rarely systemic infection occurs, but as a rule the patient's general condition does not suffer, although more or less interference with normal activity may result from the situation of the disease.

The condition may appear on any portion of the body, but the sites of election are the face, forearm, hand and leg. The disease is much more common in men than in women, and usually occurs in persons over forty, although several cases have been reported in the thirties. All the evidence thus far accumulated tends to show that heredity has nothing to do with the disease. Its immediate cause is the blastomyces, a species of yeast fungus pathogenic to man, which is to be found in the pustular exudate. So far as the cutaneous lesions are concerned, trauma, even if only a slight abrasion, has been thought to constitute the portal of entry in some of the cases reported, while in others it was impossible to establish such relationship.

The outstanding histo-pathologic characteristics are: (1) marked papillary proliferation of the stratum mucosum, with fine and coarse fingerlike projections dipping deeply into the cutis: (2) intra-epithelial miliary abscesses containing purulent exudate and generally the fungus; (3) edema and great vascularization of the cutis, and (4) dense infiltration with leucocytes, plasma cells, and giant cells.

Often blastomycosis closely resembles the verrucous type of skin tuberculosis, but it may be positively distinguished by microscopic examination, by cultures or by animal inoculation.

TREATMENT

To Bevan is given the credit for the use of the iodids in the treatment of this disease. For several years potassium iodid was relied on almost wholly, and the drug proved itself definitely useful. Hyde and Ricketts, in January, 1901 wrote: "In some cases the remedy produces the most brilliant results possible . . . On the other hand, it is to be carefully noted that while the drug seems to have a decidedly inhibitory effect on the development of the organism and on the resulting ravages, in no instance yet recorded has the continued administration of the iodid of potassium conducted any single case to a satisfactory recovery."

It was not surprising, therefore, that, as soon as the effectiveness of the roentgen ray in many other cutaneous diseases had been demonstrated, it should have been tried in blastomycosis. At the present time roentgen irradiation is acknowledged by most of the leading dermatologists as the treatment of choice. It matters little whether fractional or full doses are employed, because, with the former, treatment is repeated at shorter intervals, and the result is essentially the same in both cases. Therefore, it is of no particular consequence whether the lesion is given 0.25 skin unit dose once a week or 1 skin unit every three weeks. As in most skin diseases amenable to roentgen therapy, rays generated at approximately 60 kv. (peak), corresponding roughly to a 6-inch air gap between blunt points, are entirely adequate, except when the rays are filtered.

The question of filtration has been found to be dependent somewhat on the thickness of the lesions. Generally no filter is necessary if the papillomatous proliferatiou is not too great, but cases are encountered in which the thickness of the patches is such as to render moderate filtration desirable. These very thick patches are usually on the hands or feet, and on account of their thickness regression is much slower. In order to hasten such regression we have found it decidedly useful to add to the roentgen treatment surgical diathermy. By means of the monopolar or Oudin current the thick

patches can be dealt with much more rapidly, and much time can be saved. It is advisable not to attempt to do too much at one sitting; that is, one should not aim to destroy the entire thickness of the lesion, especially if it is located over a mass of tendons, such as on the dorsum of the hand. Too much zeal in such a case might prove unfortunate. Not only can the larger patches be destroyed, but the tiny pustules scattered around in the older parts of the area can be attacked individually.

The only difficulty associated with such work is that of anesthesia. The verrucous tissue is quite spongy, so much so, indeed, that novocain seeps out as rapidly as it can be injected. In some cases it is possible to block the area by a ring of subcutaneous infiltration well beyond its margins. In others, a block of the extremity may be necessary.

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LESIONS OF THE DIAPHRAGM*

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THE diaphragm is the musculo-aponeurotic partition which separates the chest from the abdomen. The diaphragm consists of three layers; the middle or fibro-muscular lies between the peritoneum below and the pleura and pericardium above.

Normally there are three openings in the diaphragm: (1) The aortic, which is located in front of the twelfth dorsal vertebra. Through the aortic opening pass the aorta, the vena azygos major and the thoracic duct; (2) the esophageal opening is located between the muscular fibers of the two crura. Through this opening pass the esophagus and pneumogastric nerves; (3) the vena cava opening is located between the right and middle leaflets of the tendon. Through this opening pass the superior vena cava, and usually a branch of the right phrenic nerve. The diaphragm is the principal muscle of inspiration.

A hernia is the projection of the viscera from cavities in which they are normally contained, the lining membrane of the cavities being shoved before them. The term diaphragmatic hernia, according to many authorities, should be confined to those instances in which the abdominal viscera are inclosed in a sac composed of all, or at least one of the component layers of the diaphragm. There are many writers who do not agree with this statement, claiming that 90 per cent of diaphragmatic hernias have no sacs.

Classification of anomalies of the diaphragm:

1. Hernia
   a. Congenital
   b. Acquired
2. Evisceration
   a. Having a sac
   b. Having no sac
3. Eventration
   a. Temporary
   b. Permanent
4. Thoracic stomach.

Stab wounds, gunshot wounds or even injuries may cause a rent in the diaphragm and lead to the protrusion of the abdominal viscera into the thoracic cavity. In these

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there is usually no sac, the muscle is torn, while in many instances the pleural and peritoneal coverings remain intact. This condition should be termed evisceration and not diaphragmatic hernia.

The term "eventration" likewise should not be confused with diaphragmatic hernia, as the conditions are very different. In eventration, it is true, the stomach may be located high in the thoracic cavity, but it is always below the diaphragm. The high position of the abdominal viscera is usually due to relaxation of the diaphragm.

Diaphragmatic hernia may be congenital or acquired. The majority of cases we believe are congenital. In going over the histories of some 25 cases, we failed to find any instance where trauma played an important part in the etiology. None of the cases gave a history of ever having had an injury. In some of the textbooks trauma is considered a very important cause of diaphragmatic hernia. We believe that the weakness in the diaphragm was present at birth, and that perhaps an injury may have been the immediate cause. The stomach is the organ most commonly found in the hernia sac. The colon, omentum, small bowel, spleen, liver, pancreas, cecum or kidney may be found in the sac.

Diaphragmatic hernia is more common on the left side than on the right. In congenital cases the defect is the result of faulty development. In the embryo the pleural and peritoneal cavities are continuous. Late in the process of development, a thin membrane forms extending between the lungs and Wolffian bodies. This thin membrane is the beginning of the diaphragm, the development of which may be completely or partially arrested. In the complete arrest of development a stillborn baby follows, since the condition is incompatible with life. If the defect is small, the individual may go on to adult life. In fact, many patients having large diaphragmatic hernias are symptom-free. In rare cases a patient with an extremely large defect may reach adult life. The deficiency in the lateral half of the diaphragm is more common on the left side than on the right. Eppeniger in 74 cases of true diaphragmatic hernia found 21 on the right side and 53 on the left.

The abdominal organs pass into the thorax early in life. The symptoms may occur early or late. A patient with a diaphragmatic hernia may complain for a great many years of dyspepsia; following a meal there is a feeling of fullness, accompanied by cyanosis. All of these symptoms are greatly exaggerated if the patient lies down. If the meal has been unusually large, there may be a great deal of respiratory embarrassment, and strangulation may follow. When the patient assumes the upright position, the symptoms are immediately relieved. Even the most disagreeable symptoms may pass off in the course of an hour, probably due to the emptying of the sac.

In 28 personal cases, we have never failed to obtain a history of fullness in the chest after eating, providing the patient lies down. This is true even in the case of very small hernias. In some of the patients, a definite history of cardiac disturbance was given, while others complained of a gurgling in the lower chest cavity. Many patients pass through life with practically no discomfort, and it is only after careful roentgen examination that the hernia is discovered.

A word here regarding the roentgen examination, with special reference to the diaphragm. It is only through very careful examination that the smaller sacs can be discovered. The upright examination is not sufficient, since in most cases the hernia cannot be discovered even by manipulation. The difference in the diaphragmatic excursions described by so many writers is present in only a very few of the cases. In our personal examination of 28 cases, we have never observed any difference in the diaphragmatic excursions. Many of the textbooks state that when a diaphragmatic hernia is present on the left side, the excursions of the left diaphragm will be absent, or the movements will be reversed. If this phenomenon is depended upon to make a diagnosis, most of the cases will be missed. If the hernia is through the central portion of the diaphragm and is extremely large, the reverse movements may be noticed.

In our experience, the large majority of cases occur through the esophageal open-

ing, and no changes in the movements of the diaphragm occur. Patients having lesions of the phrenic nerve will always show disturbance in the diaphragmatic excursions.

It is imperative that all patients be examined in the horizontal position. And while in this position the patient must be turned at many angles, as the hernia may be discovered in only one particular posture. It is possible that a hernia may be present only part of the time. By this, we mean the stomach may be located entirely below the diaphragm during the examination, while at a later examination the hernia may be obvious. Repeated examinations are therefore advisable in all suspicious cases. The history of one case is here illustrated:

A middle-aged patient had been advised by her physician to assume the knee chest position a certain number of hours each day, to correct an enteroptosis. This treatment was carried on for a year, but the patient received no benefit. Some months later, she developed pain in the right upper quadrant which was thought to be due to a gall-bladder lesion. In the course of the examination a barium enema was ordered. At this examination the hepatic flexure was located high under the diaphragm, anterior to the liver. Careful examination of the diaphragm was made, with special reference to the presence of hernia. At this time we made a diagnosis of eventration, and advised re-examination at a later date. At the second examination, the hepatic flexure was located in the pleural cavity, having herniated through the right side of the diaphragm. The patient was later operated on at the Mayo Clinic. This case was in all probability congenital, the liver having served as a plug, keeping the abdominal viscera out of the thoracic cavity. The assuming of the knee chest position probably allowed the bowel to herniate through the congenital opening.

Martland in 1909 reported the autopsy on a man seventy years of age, who died with congenital deficiency in the central tendon of the diaphragm. The opening connected with the pericardial cavity. The heart at autopsy was completely surrounded by transverse colon and great omentum. The patient had never been confined to bed before admittance to the hospital. The clinical picture was that of an acute right heart dilatation. In this case there was no hernial sac.

Evisceration, often called traumatic hernia, or hernia spuria, is encountered far more often in men than in women, as men are more frequently exposed to trauma. In 90 per cent of the cases the left side is involved. This fact may be explained by the manner in which the injury occurs. A blow is usually struck by a right-handed individual who strikes at the most accessible part, namely, the left side. The liver on the right side acts as a plug and does not allow the escape of the abdominal viscera into the thoracic cavity.

Of 561 cases of hernia spuria collected by Eppeniger, 527, or 95 per cent occurred on the left side; 34 or 4.4 per cent occurred on the right side. One hundred and twenty-three cases of evisceration were found in the literature by Green, following stab wounds of the diaphragm. To this number he adds 6 personal observations. In about 50 per cent of all stab wounds involving the diaphragm, there is a protrusion of the abdominal viscera into the thoracic cavity. There are various other causes of evisceration, such as gunshot wounds, severe straining, or crushing injury. A crushing injury or blow may tear the muscle, leaving the serous surfaces intact. This type of evisceration is very difficult to diagnose clinically, as there is no wound, and the symptoms are very misleading.

In 250 cases of traumatic diaphragmatic hernia collected by Leichtenstern, the diagnosis was made in but 5 cases prior to death. The symptoms of evisceration come on acutely, as a rule. There may be severe pain in the upper abdomen, rapidly followed by collapse. The lower half of the chest feels constricted, and dyspnea is severe. These symptoms may immediately follow the injury. Not infrequently, however, the patient may show no symptoms for days following the injury. Vomiting is one of the earliest symptoms in the left side cases and is usually constant. Hiccoughing as a rule accompanies the vomit-

ing. For a long period of time following the diaphragmatic hernia an irritating cough and dyspnea follow the least exertion. Makins states that perforation of the diaphragm by a small bore bullet may cause no symptoms.

Eventration of the diaphragm is classified as a rather rare condition. It has been the writer's experience in gastrointestinal work that it is met with rather frequently. Eventration, commonly called high diaphragm, is thought by some to be due to increased abdominal pressure, which theory has little support, as the condition is met with more commonly in men than in women. Even after repeated pregnancies the condition is relatively infrequent. The majority of authorities believe the condition to be congenital. The points that favor this are that it occurs in infants and children. The lung on the affected side is not compressed and there is no history of trauma or infection which might lead to relaxation of the diaphragm.

In 652 cases of hernia, true, false and eventration, Eppeniger found 17 cases of eventration. Bayne-Jones[1] reports 45 cases of eventration. Males are more commonly affected than females. The condition is much more common on the left side than the right. In his series of cases, all but 3 were located on the left side. As a rule the condition causes no symptoms and is discovered only on careful roentgen examination. In 3 cases reported in the literature, occurring on the right side, only one was diagnosed before death.

The physical findings depend upon the height of the diaphragm and on which side eventration is present. The findings vary with the filling and emptying of the stomach. If the stomach or bowel contains fluid, there will be a splashing or metallic sound over the lower chest. If the diaphragm is very high, the heart may be displaced. Litten's shadow is usually absent in eventration. It is often quite difficult to differentiate pneumothorax, subphrenic abscess producing gas, and eventration.

Right-sided eventration may present very few findings, due to the presence of the liver. If the bowel is above the liver, signs may be present. The diaphragm in eventration is usually very thin, and contains very few muscle fibers. Sailer and Rhein[1] report one case of eventration and collected twelve others. The first case of eventration was reported by Petit, in 1790.

Eventration of the diaphragm may be permanent or temporary. Temporary eventration may be caused by gas distention of the stomach. In temporary eventration the diaphragm excursions are never reversed but may be limited. There is no paralysis of the diaphragm. It is very difficult to distinguish the permanent type of eventration from phrenic nerve paralysis. There is usually an absence of movement of the lower ribs on the affected side. Some of the acquired types may show increased movements on the affected side. The absence of chest movement in the lower half may be due partially to the hypoplasia of the lung on the affected side. The normal lung helps in the movement of the ribs.

SUMMARY

To identify diaphragmatic hernia, the patient must be examined in many different positions. All gastrointestinal patients must be examined in the horizontal position, or many diaphragmatic hernias will not be identified. In only 2 of the 28 cases have we had the least suspicion of diaphragmatic hernia in the erect position. It is absolutely imperative that the patient be placed in many positions, or most of the cases will be unrecognized. The tilt table is of great value in searching for hernia. Be sure that the patient has had no food for at least ten hours before the examination.

[1] *Arch. Int. Med.*, 1916, xvii, 221.

[1] Eventration of the diaphragm. *Am. J. M. Sc.*, 1905, cxxxi, 688–705.

SIMPLE PENETRATING ULCER OF THE GREATER CURVATURE OF THE STOMACH*

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THE standard posteroanterior projection of the barium filled stomach registers simply a silhouette of the gastric ventricle showing two edges which correspond to the lesser and greater curvatures. Because of this fact, it is particularly fortunate from the roentgenological standpoint that nearly all penetrating gastric ulcers occur on the lesser curvature of the stomach. Were it not for this event, the roentgen examination would be far less valuable as an aid in the diagnosis of gastric lesions than it is. Simple penetrating ulcer on the upper part of the greater curvature is so rare an occurrence, that many roentgenologists of large experience have never seen one, and there is a scanty literature on this particular lesion. A relatively small number of penetrating ulcers are demonstrated on the posterior wall of the stomach and a still smaller number on the anterior wall, these being usually seen on roentgenoscopic study only, by rotating the patient into positions which bring these portions of the stomach into silhouette. As penetrating ulcers on the proximal two-thirds of the greater curvature are so rare, it excites much interest when found and incidentally, often much doubt as to the accuracy of the roentgenologist's finding. It has even been stated that ulcers never occur on the greater curvature, excepting of course the postoperative penetrating ulcer, which is sometimes found at the site of a gastroenterostomy, and which is not considered in this presentation (Fig. 1).

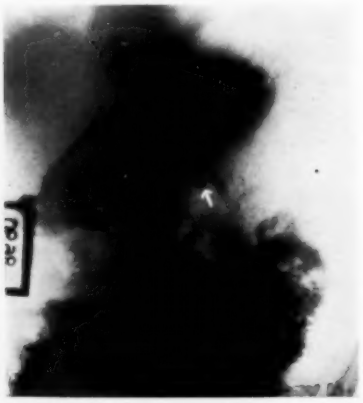

FIG. 1. Penetrating ulcer on greater curvature at site of operation.

Contact with 3 cases in which characteristic roentgen shadows of the crater of a penetrating ulcer were found on the greater curvature in the upper portion of the stomach is the stimulus for this work. In one of these cases, a postpyloric peptic ulceration was probably the principal lesion, according to the roentgenological findings. In one of the cases the ulcer crater was found high on the greater curvature in the proximal third of the gastric ventricle; in the other case it was located at the junction of the upper with the middle third. In the discovery of this unusual lesion, several roentgenoscopic studies were made in each case (excepting the third case), together with serial film exposures, numbering from twenty to twenty-five, which covered the complete gastric cycle in all stages and each case was re-examined for verification of findings. In one we have operative confirmation, thus establishing the premises on which this paper is based.

In the normal empty stomach the filling of the gastric ventricle with the opaque material, in the great majority of cases, occurs from below upwards. After entering the stomach, the meal is seen to literally drop down in a vertical direction from the esophageal opening to the most dependent portion of the greater curvature. As the succeeding material pours into the stomach the opaque shadow enlarges upward, finally filling the entire cavity with the exception of the superior portion of the fundus, which invariably contains a quantity of air or gas, and the uppermost part of the greater curvature, which, owing to the deep rugae or wrinkled gastric mucosa, seldom is stretched out sufficiently by the usual twelve to sixteen ounce opaque meal to

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give the same smooth edged border as occurs in the distal portion of the same curvature. Thus a situation is present due to which it is easy to overlook an irregularity caused by an intrinsic lesion if it should be small in size and occur on this part of the greater curvature, as does the lesion under discussion.

Seeking an explanation for the greater frequency of occurrence of ulcer on the lesser curvature, whether traumatic, as from contact with food or too high or too low temperature causing a local tissue change such as a lowered resistance, or whether due to other mechanical or perhaps biochemical cause, one must admit that the mode of entrance of material into the stomach along the lesser curvature, in the so-called "canalis ingestorius," results in this groove receiving more damage, shock, etc., than do the other portions of the stomach, while the upper part of the greater curvature is the part least so affected and is the last to have direct contact with ingested material. Ulcer in the distal third of the stomach occurs on both the lesser and greater curvatures but such lesions are not under consideration in this presentation. On account of the rarity of ulcer in the upper part of the greater curvature, even the roentgenologist of experience seldom pays more than passing attention to this part of the gastric shadow in the search for roentgen signs of intrinsic change. Another pertinent point in this analysis is the fact that, as the opaque material passes through the terminal duodenum into the jejunum, the most frequent location of the junction between these two parts of the small bowel is at the edge of the greater curvature in its vertical portion, at or near the junction of the upper with the middle third. On this account one may easily overlook the ulcer defect described herein, particularly in the screen study. This may explain why the first of the cases in this presentation was not recognized at once although it is apparently the largest of the three that were encountered.

CASE REPORTS

CASE 1. (Fig. 2.) White adult male, aged forty-three, who was sent to the Cooke County Hospital and referred for roentgen study for gastric ulcer. The symptoms fitted well with the usual complex for such a lesion. On roentgenoscopic observation the stomach was seen to be filled in the usual manner, of medium size, and "fish-hook" shaped (in standing posture). No defects were found on the lesser or greater curvature, but no particular attention was paid to the upper portion of the greater curvature except to dismiss as unimportant an apparent niche which was considered a folding over of the upper part of the stomach. The pylorus opened after slight delay, and a normal duodenal bulb was visualized. Serial films made immediately after roentgenoscopic study showed the shadow previously not regarded as

FIG. 2. Penetrating ulcer on greater curvature. Case 1.

material, apparently attached to the upper part of the greater curvature. It had a rounded lower margin and a horizontal upper border, above which was a small dark transparency which looked like an air bubble. This peculiar shadow coincided with a typical Haudek's niche, except that it was not on the lesser curvature, so not much attention was paid to it. A roentgen report of "no definite gastric lesion" was made with a question of a defect on the greater curvature at upper third of undetermined significance. A re-study of the case some weeks later again showed the unusual defect on the greater curvature which was found on the first observation, this time on the screen observation as well. A roentgen report of probable atypical penetrating ulcer was made, but this was not concurred in by the surgeon or the internist who believed that ulcer was present, but not where the defect was seen roentgenologically. They believed it to be located in the distal third or in the duodenum, and that the ulcer was not being revealed by the roentgen ray. The patient's

symptoms continued and operation was finally performed at which time a rather large penetrating ulcer was found on the upper part of the greater curvature, coinciding with the roentgen findings. No ulcer was found in the pyloric region. The ulcer had almost perforated the entire gastric wall and was surrounded by a mass of adhesions and fibrous tissue, which apparently prevented a complete perforation. In this mass of tissue was found the crater pocket of the ulcer; the entire area was resected. The patient made a satisfactory recovery and was later discharged as cured.

CASE II. (Figs. 3 and 4.) This patient, seen at the Garfield Park Hospital, was a white female, aged thirty-eight, who had been suffering from gastric disturbance for a period of about six years. Her story was more or less that of a postpyloric peptic ulcer with pain coming on two to three hours after eating. She had had several attacks at varying intervals which seemed to indicate ulcer activity with intervening periods of normal health. She complained of frequent belching of gas, attacks of nausea with occasional vomiting. On several occasions she awoke during the night with a burning pain in the "pit of the stomach," indicating the epigastric area. The patient was referred for roentgen study, her physician having made a diagnosis of duodenal ulcer. On roentgenoscopic study no definite alteration in the shadow of the gastric ventricle was observed nor was the duodenal bulb altered in appearance, and the villous portions of the duodenum presented the serrated edges and course of the normal. On studying the serial films, a constantly appearing small knot-like shadow was found on the greater curvature at about the junction of the upper and middle thirds. On a five-hour recheck, the shadow defect was verified on the screen and it persisted after manipulation which resulted in distinct pain. Based on the former experience, detailed under Case I a roentgen report of small penetrating ulcer high on the greater curvature was made. The referring physician was disappointed in not having his diagnosis of duodenal ulcer confirmed and was inclined to disregard the roentgen findings. However, an ulcer treatment was instituted and the patient showed slow but continued improvement. This case was not operated upon and the referring physician still thinks he has been treating duodenal ulcer in spite of a normal duodenal bulb shadow and the typical ulcer defect on the greater curvature. All films taken of the barium filled stomach presented the same defect, which in the opinion of the writer, is definite proof of a penetrating ulcer of medium depth. The duodenal bulb at no time presented any indications of an intrinsic lesion. A followup study of this patient will be made at a later date. Lacking operative proof the findings are based on very definite, and in my opinion, sufficient roentgen evidence to warrant the diagnosis of penetrating ulcer on the greater curvature.

FIG. 3. Penetrating ulcer on greater curvature. Case II.

FIG. 4. Penetrating ulcer on greater curvature. Case II (6 hr.).

CASE III. (Fig. 5.) This patient is an adult male who was in the army during the world war, serving overseas, during which time he

was hospitalized in France and operated upon for "gastric ulcer and appendicitis" (his statement). Unfortunately, no details of the operation or operative findings are available. He still complains of the same symptoms which he had while in the army and which indicate a hyperchlorhydria, some loss in weight and tenderness and constant pain in the abdomen and epigastrium. Pain comes on immediately after eating and he complains of nausea before meals. This pain frequently occurs during the night. There is vomiting but the material presents no evidence of blood. No blood nor mucus was found in the stools. He has never been jaundiced. The patient refused cooperation for gastric analysis, but a frequent belching of sour-acid-like material and gas indicates hyperchlorhydria. His case is considered one of gastric neurosis by the internist. Roentgen examination shows a rather large stomach which, in various stages of its cycle, appears to be normal in outline with an abnormal duodenal bulb shadow configuration characteristic of intrinsic change as in ulcer. The villous portions of the duodenum and the jejunal shadows present no unusual features and the latter can be easily separated from an apparent overlapping with the greater curvature. The serial film exposures, however, present a constant defect on the upper part of the middle third of the greater curvature, which has the characteristic shadow appearance of a small shallow ulcer crater. A roentgen report of a small penetrating ulcer located high up on the greater curvature was made. This patient was recently hospitalized and is still under observation.

CONCLUSIONS

1. Extensive inquiry among a fairly large group of roentgenologists, and a perusal of the literature indicates that penetrating ulcer of the upper part of the greater curvature of the stomach is a comparatively rare lesion.

2. The roentgen-ray evidence of a gross defect in the gastric lining as occurred in the cases reported here, can properly be interpreted as representing the site of a penetrating ulcer.

3. The gastric rugae being deepest on the greater curvature in the fundus of the stomach most often results in an incomplete filling of this particular part, which irregularity is in direct contrast to the smooth, even edges of the lesser curvature and of the distal portion of the greater curvature, and therefore it is possible that ulcer defects which occasionally occur at this point escape detection in view of the infrequency of their occurrence at this point.

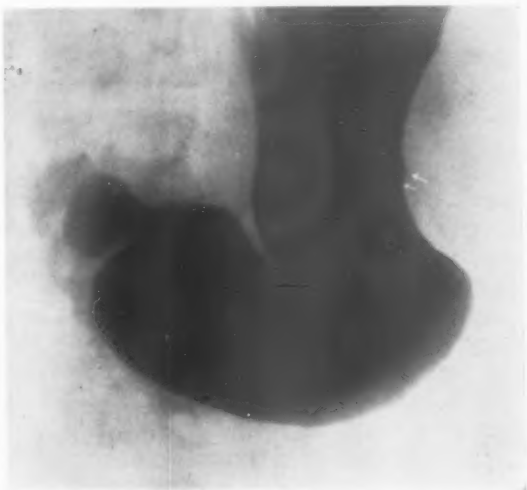

FIG. 5. Penetrating ulcer on greater curvature. Case III.

4. The proximity of the beginning of the jejunum which, on roentgen projection coincides closely with the upper part of the greater curvature, may also be a cause of the failure to recognize a penetrating ulcer in this particular area.

ROENTGEN RAYS IN THE NEGATIVE DIAGNOSIS OF CANCER OF THE STOMACH*

BY JAMES W. HUNTER, JR., M.A., M.D.

NORFOLK, VIRGINIA

IN an article by H. A. Christian,[1] of Boston, the author makes the following statement: "No one would question that we make more accurate diagnoses, largely aided by the roentgen rays; but, unfortunately, the bulk of our cases of cancer of the stomach, when diagnosed, are too far advanced for there to be any great hope of cure, and often they are too advanced for surgery to offer any real help in the amelioration of symptoms. In passing over in a mental review my own hospital experience with patients having stomach disturbances productive of symptoms two things impress me: (1) that most cases of cancer of the stomach are rather definitely diagnosable as such, at the time the patient enters the hospital, on the basis of history and ordinary physical examination; and (2) that extremely few cases of cancer of the stomach are unexpectedly revealed by roentgen ray examinations." Christian bases his experience upon the examination of 4,000 consecutive admissions to the medical wards of the Peter Bent Brigham Hospital. Of these 17 patients were diagnosed as having carcinoma of the stomach.

It has not been my privilege to examine clinically 4,000 consecutive medical cases admitted to the wards of a general hospital, nor do I know of a single roentgenologist who has made such a study; yet it is my belief that there are few roentgenologists whose experience is limited to only 17 cases of gastric cancer. Most of us have had opportunities of examining many times this number, not only observing them upon the screen and plate, but we have also had the privilege of checking our successes and failures (and our agreement or disagreement with the internist) at operation, by subsequent history and by autopsy. And so I can but feel that the conclusions as laid down by the author of the paper, to which we have alluded, are somewhat immature. For my own part it is my opinion (1) that these conclusions are unwarranted, and (2) that there is much to be said of the negative roentgen diagnosis of carcinoma of the stomach.

To the first statement that "most cases are rather definitely diagnosable as such at the time the patient enters the hospital, on the basis of history and ordinary physical examination," I should like to report two cases.

CASE 1. Mr. W., aged seventy-one, referred by Dr. C. J. Andrews, May 27, 1922; formerly stevedore, now bridge tender; complains of pain in the epigastrium which has lasted over a period of three years. This pain is relieved by vomiting and soda. The patient has lost 75 lb. in 18 months. Father died at age of ninety-six; mother at age of ninety-four; two sisters died at infancy; one brother died of heart trouble at the age of forty-five; one sister living; no cancer nor tuberculosis in the family. Patient has never had any illness or operation; right arm broken twice twenty-five years ago.

Physical examination shows heart and lungs negative; teeth badly worn; large frame, but evidently much loss of weight; slight tenderness over right epigastrium. Blood pressure 130/90. Reflexes normal.

Clinical Diagnosis. Pyloric obstruction; carcinoma of the stomach.

Roentgenological Report. Stomach somewhat enlarged, but normal in size, position and emptying time; no evidence of ulcer or cancer; "cap," not obtained; gall-bladder, throws heavy shadow 2 by 1¼ inches; terminal ileum, negative; appendix, long, kinked and apparently adherent to cecum; cecum somewhat splotchy; colon, negative. *Impressions:* Pathological gall-bladder (probably containing calculi); pathological appendix; "cap" (bulbus-duodeni) not obtained.

Operation. Exploratory laparotomy, Dr. Andrews, June 10, 1922. Upon opening the abdomen numerous adhesions were noted and a mass resembling granulation tissue was found. The surgeon was convinced that this was an inoperable carcinoma and immediately closed the abdomen. In this opinion, however, the roentgenologist, who was present, did not agree. *Findings:* Carcinoma of pylorus; gall-stones; gall-bladder fairly normal; no evidence of acute cholecystitis.

[1] Some observations, largely pessimistic, on early diagnosis of gastric cancer. *J. Am. M. Ass.*, 1924, lxxxii, 2011–2013.

* Read at the Sixth Annual Meeting, Eastern Section, AMERICAN ROENTGEN RAY SOCIETY, Atlantic City, N. J., Jan. 22–24, 1925.

Postoperative Diagnosis. Carcinoma of pylorus; gallstones. No specimen removed for further study, hence no microscopic examination made.

The patient made an uneventful recovery and returned home. In due time he resumed his occupation. Strange as it may seem, he quickly recovered his strength and his son tells me that he is now enjoying excellent health.

This is clearly a case where the surgeon erred in his diagnosis, a diagnosis made from the history of the case and apparently confirmed at operation. Yet the roentgenologist also failed to tell the whole story; for he should have suspected the duodenum on account of his failure to find the "cap." A review of the case would seem to indicate that the diagnosis should have been an old duodenal ulcer with possible rupture and gallstones. Had the patient not recovered and resumed his occupation, as well as regained his health, this case would have been claimed as one in which the roentgenologist utterly failed.

I recently saw a case of extreme emaciation in a negro, in whom I found an enormously dilated stomach (about the size of a man's head) and a complete stenosis of the pyloric opening. I considered that this condition was due to an old duodenal ulcer and advised operation. Here again, carcinoma was diagnosed and the abdomen closed. Unfortunately, the patient did not recover from the operation. Unfortunately also, no specimen was removed for microscopic study and no autopsy was obtained. Primary carcinoma of the duodenum, the pathologists tell us, is extremely rare. At any rate no malignancy was found involving the stomach.

In further reference to Case 1, it is most interesting to note that two of his sons have also been my patients. One of them died in early manhood from a disease vaguely diagnosed as due to some lesion of the gall-bladder, but as this was before the advent of the opaque meal, no intelligent means for study was at hand. The other son, a man of about forty-five, was recently examined by me and definitely diagnosed as having a pathological gall-bladder. Lavage through the duodenal tube has apparently made a cure.

Case II. Mr. McC., aged sixty-three, white, entered St. Vincent's Hospital on May 29, 1924, in the service of Dr. W. B. Martin, complaining of hemorrhages from the mouth and bowels, for which he had been treated for three or four weeks. There were several hemorrhages a day from the bowels, and generally six or eight stools; no pain nor straining. Inquiry elicited the fact that the patient has had bad teeth and the usual diseases of childhood, as well as influenza, but no cough except when he has a cold, though he has had bronchial trouble and catches cold easily. Had earache when a boy. Eyes weak. Has had one thumb amputated. Voids two or three times at night. Suffers with swelling of feet. Father died of tuberculosis; mother died of pneumonia; two sisters dead; no history of cancer or tuberculosis except in case of father.

Physical examination shows a considerable loss of weight with marked pallor, sweating and recent loss of blood. Skin over both legs below knees covered with numerous copper-colored areas; mucous membranes very pale; tongue slightly coated; teeth absent; heart enlarged to left; no murmur; pulse rapid and of poor quality; blood pressure 120/65. Abdomen distended but not tender; no nausea; edema of both legs.

Clinical Diagnosis. Secondary anemia, probably due to gastric cancer.

Roentgenological Report. Stomach and "cap" negative.

In spite of several transfusions of citrated blood the patient continued to grow worse (generally rallying, only to have another hemorrhage) and died on June 20, 1924.

Autopsy. (Dr. J. A. Wilkins.) Body of a well-developed and well-nourished adult white male, measuring about 72 inches and weighing about 165 pounds. Examination of the exterior shows nothing abnormal with the exception of an extreme sallowness of the skin and mucous membrane. Permission given for examination of the abdomen only.

An incision was made from the ensiform to the pubes and on opening the abdomen the peritoneum was found to be smooth and glistening throughout, the subcutaneous and peritoneal fat being abundant. On inspecting the abdominal cavity no ascites was found. The appendix was normal and there were no adhesions except an occasional fibrous band in the region of the spleen. On opening the stomach and intestines they were found to contain a quantity of blood (approximately 1000 cc.) but no ulceration could be detected to account for the hemorrhage. The lower three inches of the esophagus was removed and beneath the mucosa were seen a number of dilated veins; no point of rupture, however, probably owing to collapsed condition of veins.

The spleen was about five times its normal size and weighed about 700 grams and in its vicinity several tortuous and enlarged veins were seen. On its surface several calcified tubercles were seen. On section there was a generalized fibrosis and atrophy of the lymphoid tissue. No infarcts were found, but the splenic vein contained a partially organized thrombus. The liver was reduced in size and weighed approximately 1200 grams; its surface was studded with small, hard nodules, and on section it was very firm and fibrous. One small yellow adenoma (1 cm. in diameter) was seen on the cut surface. The portal vein contained a fairly well organized thrombus, which occluded half its lumen. This thrombus seemed to be much older than that in the splenic vein. The gall-bladder and ducts, pancreas, kidneys and prostate showed no gross abnormality.

Diagnosis from Autopsy. Splenomegaly with thrombosis of splenic vein; cirrhosis of liver with thrombosis of portal vein; hemmorrhage into stomach and intestines from rupture of esophageal vein?

It is needless to comment that this is a case where the clinical symptoms, as interpreted by the attending physician, and the roentgenological report did not agree and that, had an autopsy not been obtained, the case would have remained as one in which the roentgenologist had signally failed.

To the second statement made by Christian, *viz.*, that "few cases of cancer of the stomach are unexpectedly revealed by roentgen-ray examination," I would submit the following case:

Case III. G. H., aged fifty-four, white, salesman, formerly farmer, was admitted from the clinic to St. Vincent's Hospital in the service of Dr. W. B. Martin on November 5, 1924, complaining of a diarrhea following eating, particularly meat and sweet potatoes, though all foods seem to provoke a stool, which appears to come on eight hours after eating. For the past month the patient has grown weaker with a considerable loss of weight beginning in June. No pain nor fever. Patient has had the usual diseases of childhood; typhoid fever fifteen years ago; sun-stroke eighteen years ago; poor health ever since; rheumatism twenty years ago and again one year ago. Father died at age of eighty-six; mother at age of seventy-three; one brother died at age of sixty-one of pneumonia; two sisters living and well; one sister died at age of forty of skin trouble. No cancer nor tuberculosis in the family. Has been married twenty years. Has five children who are living and well; wife has had no miscarriages.

Physical examination is negative in general, though the mucous membrane of the mouth is pale and the teeth are bad; tongue smooth and glossy; tonsils atrophied. The abdomen is emaciated but there is no tenderness. The liver is not palpable; spleen normal. A hard nodular mass is to be felt in the left and middle quadrant, extending about ½ inch to the right of the umbilicus and one inch below and three inches to the left of the umbilicus. This is not tender on palpation. The skin shows a deep pigmentation in the face, neck and hands. The extremities are emaciated. Wassermann reaction negative.

Clinical Diagnosis. Tumor of sigmoid flexure of colon, possibly carcinoma.

Roentgen Examination. Extensive carcinoma of the pyloric end of the stomach. A second attempt to examine the colon by the opaque clyster was not satisfactory as the patient was unwilling to cooperate and expelled the enema.

Operation. (Dr. R. L. Payne, November 23, 1924.) Exploratory laparotomy. The stomach showed a carcinoma of the lesser curvature and posterior wall involving all of the antrum and one-half of the organ on its posterior aspect. The pylorus was open. There were metastases of the pancreas and all of the surrounding glandular area. The colon was not involved; liver not involved. One large gland was removed from the greater curvature for diagnosis.

Pathological Report. (Dr. Mary E. Roche.) Growth on outer surface of greater curvature of stomach. Tumor of stomach which could not be removed. Gland crescent shaped 6 by 4 by 1.5 cm.; capsule infiltrated on section; cut surface greyish and translucent; two areas of coagulation necrosis, about 1 by 1.5 cm. Microscopic examination shows a lymphoblastoma.

Roentgen Examination of the Chest. November 29, 1924. Left apex cloudy; very dense shadow upper portion of lower lobe of left lung. Aneurysm of the arch. *Impressions.* An old tuberculous lesion.

It is needless to comment, as before, that this is a case in which the history and physical findings would seem to justify a diagnosis of carcinoma of the sigmoid, but a roentgen examination corrected the error and showed the true nature of the case. Also the roentgen diagnosis was confirmed and the provisional diagnosis disproved.

The three cases reported above are but a few of the many cases seen in a number of years devoted to the practice of roentgenology both privately and in hospitals. They are, however, quite sufficient to sustain the contention that the statements made by Christian are unjustified. It is quite true that the roentgen technique has as yet not been sufficiently perfected to diagnose the earliest onslaught of a growth in the stomach, and so far as the neighboring organs are concerned we are still far at sea. I recently saw a case of marked jaundice, in which I made a diagnosis of a pathological gall-bladder and a negative stomach. These observations were confirmed on operation, yet a few days later the patient died of carcinoma of the pancreas involving the common duct. Very foolish indeed is he who would attempt on all occasions definitely to rule out an involvement of the stomach. But I do feel that the roentgen diagnosis of gastro-enterological lesions is the most logical one. Like a great gastro-enterologist, to whom I listened two years ago, I feel that any sort of history can be obtained in any given case. And so I would modify an expression of Sir Joshua Reynolds: We must mix our barium with brains. And having done this, I think that we, with our experience as medical men devoting ourselves to the study of roentgenology, can definitely say that in the great majority of instances a negative diagnosis of carcinoma of the stomach is of value.

FRACTURES OF THE OS CALCIS*

BY ARCHE C. HALL, M.D.

DETROIT, MICHIGAN

FRACTURES of the os calcis occur much more frequently than it was formerly supposed. If not successfully treated they are fruitful of as serious disability as any of the bones of the lower extremity. Even now, they are often overlooked and recognized only after weeks or months subsequent to their occurrence. Real surgical problems at any time, old cases present increased difficulties and often terminate in permanent total disability, as far as active workable use of the limb is concerned.

It is not our purpose to present a mass of statistics nor to go deeply into technicalities, but to emphasize the importance of early recognition of this fracture and to outline a plan of prompt, rational treatment. The observations we wish to make pertain to recent fractures, and are based on the personal care of more than 100 cases over a period of eleven years, and although the method we shall describe may not be all that is desired, it has given us better results than any other.

Fractures of the os calcis occur in various ways. Dr. Waldblott tells me that during the war entire crews sustained this type of fracture from the explosion of depth bombs beneath their ships. In our experience, a laborer at Selfridge Field during a blast was struck by a flying piece of stump, that came several hundred feet across the field wounding him only in the heel, and badly fracturing his os calcis. The usual history, however, is that of a fall anywhere from four to thirty feet, the patient landing on his heel. Any such history, with even a partial disability should be the occasion of immediate roentgen examination.

Let us see what happens in a typical case. The projection of the body weight upon the heel with sufficient force to fracture the os calcis causes flat foot by rendering the plane of the os calcis more horizontal. The bone is usually comminuted, is forced upward and bulges outward, thus impinging on the structures that pass normally beneath the external malleolus, and often impinging upon the lower end of the fibula itself. There may or may not be lateral displacement. If present, it is important in that it disturbs the weight-

* Read at the Sixth Annual Meeting, Central Section, AMERICAN ROENTGEN RAY SOCIETY, Detroit, Mich., Feb. 19–21, 1925.

bearing line. Irritation and reaction will cause contraction of the tendo Achillis, and the upward pull of the powerful calf muscles tend to displace the posterior fragment and increase flat foot. Thus, we have several factors, each in itself sufficient to produce a serious disability.

The old method of treatment, that of immobilization in plaster with the knee flexed and the foot in dorsiflexion, and one that we are sorry to say is still sometimes used, caused disability of from twelve to eighteen months, and often permanent disability. When surgeons of wide experience were asked how to get good results in serious fractures of the os calcis they were unable to give a satisfactory answer. Realizing the great need of a dependable method and having considerable material, we began several years ago under the skillful roentgen guidance of Drs. Hickey and Evans, to attempt the development of a technique that would give better results. Part of this technique is original, part has been obtained in other places. Every step has a definite purpose and we consider the sequence of steps important. The diagnosis having been made, the type of fracture having been studied by complete roentgen examinations, the patient is placed at absolute rest in bed for a week or ten days, or until the active reaction has subsided. The leg and foot are carefully prepared for operation.

Under general anesthesia, the patient lying face downward on the operating table, the first step is to lengthen the tendo Achillis by open operation, thus releasing the tension on the os calcis caused by the contraction of the powerful calf muscles. This allows free anteroposterior ankle motion, and makes easier the breaking up of impaction and the molding of the foot later on. Second, with the patient's foot in a lateral position, with a sandbag conforming to the inner side of the foot under the internal malleolus, a sterile roller bandage is placed in the direction of the long axis of the os calcis just under the external malleolus, and struck a few sharp blows with a mallet. This should restore the normal contour under the external malleolus and help correct any lateral displacement. Next, with the toes caught over the foot of the operating table, the patient again face downward, an incision is made just above the posterior end of the os calcis, immediately in front of the tendo Achillis. A very small incision is needed on either side. A heavy steel sound is passed through. With the toes caught over the table, a downward pull on the sound and an upward push with a board fashioned somewhat like the arch of the foot, the angle of the os calcis is corrected and the arch of the foot restored. This completes the operative part.

We now have a foot that has been reformed and one that we are able usually to mold into a normal position. It is, however, highly important that the cast be carefully applied in such a manner as to maintain this corrected position, and to hold it until the cast is firm. Part of the roller bandage, slightly flattened should be placed under the external malleolus and incorporated in the cast, being careful to pad it in such a way that there will be no pressure necrosis, and while the cast is drying it should be molded with the hands so as to preserve the arch of the foot and to keep the downward position of the os calcis. The cast extends from the toes to the knee. The tendo Achillis being relaxed by lengthening, it is not necessary that the cast should extend farther. The cast is allowed to remain in place for a month, but as soon as the wounds have healed, it may be bi-valved for light massage, and physiotherapy. At the end of the month the cast is discarded. Three weeks to a month is given to massage and physiotherapy. All normal movements of knee, ankle and foot are allowed without weight bearing. At the end of this period the patient is allowed to walk with an orthopedic shoe, a felt pad to support the instep and a one-piece brace from the heel to the knee, being strapped with a cuff at the upper end.

The results obtained by this manner of handling fractures of the os calcis have been most gratifying. We have never had a case infected, and many patients have returned to work able to resume their former occupation in from three to four months after injury. In others, it has taken six months to restore the desired function.

We have tried almost every method that seemed logical or worth while, have been conservative when it seemed at all possible, and have settled on this as routine procedure for recent fractures of the os calcis when there is any appreciable displacement along the lines that we have indicated. A great many of our cases have been industrial, many of them were carpenters, roofers or laborers, men in whom it was important that good functional and anatomical results should be had.

We would like to emphasize the importance of carrying out this procedure in cases with the arch slightly flat and very slight bulging of the external malleolus, and with almost a normal contour of the os calcis. Formerly we occasionally treated such cases by the application of plaster of Paris for immobilization, followed by the usual fracture treatment after the cast was removed, but invariably with bad results.

SUMMARY

In typical cases, temporizing is disastrous. Too much conservatism gives bad results. Careful roentgen study is essential. The tendo Achillis should be lengthened, the impaction broken up, the arch restored and a carefully fitting cast applied. Proper shoes, foot balancing, support and massage are important postoperative considerations.

CENTRAL CHONDROMA OF MIDDLE THIRD OF SHAFT OF HUMERUS

A CASE REPORT*

BY CHARLES M. RICHARDS, M.D., JAMES B. BULLITT, M.D. AND DOXEY R. WILSON, M.D.

SAN JOSE, CALIFORNIA

P. H., male, aged twenty-two, clerk, first seen in February, 1923. In 1917 he had a severe attack of pneumonia followed by a dull aching pain in the left arm, which has persisted since that time in spite of all types of antirheumatic treatment by numerous physicians. Obtaining no relief he stopped treatment and did not see a physician again for one and a half years prior to Feb. 1, 1923, although the pain continued and he was not able to use his arm. On Feb. 1, 1923, his arm was so swollen that he could not roll up his sleeve. There was a fusiform swelling of the lower third of the humerus, hard and nodular generally but with a few soft semifluctuant areas the size of a walnut, with hard bony borders. Above the elbow joint and below the tumor the arm measured 20 cm. in diameter, over the most prominent part of the tumor 31 cm., and around the middle of the arm 25 cm. There was some atrophy of the left forearm and hand, with loss of power; there was no limitation of motion or impairment of sensation. The Wassermann reaction was negative, white blood count 11,800, with 85 per cent polymorphonuclears, Hg. 85 per cent; urine was negative, and the physical examination negative as well as the past history and family history. Roentgen studies were made of the condition. On February 23, while driving his car, he heard a snap in his arm and had a tingling sensation in the fingers; his arm dropped to his side and he was unable to use it; spontaneous fracture through the tumor had occurred. On February 25 he was operated upon; an incision was made into one of the soft areas, a gelatinous currant jelly colored material rolled out of the wound which led into a large bony cavity with thin walls which could be mashed with the fingers; the soft tissues were infiltrated with the same material. Frozen section diagnosis from the laboratory was myxosarcoma. A disarticulation

* With Pathological Report by Dr. G. Y. Rusk, University of California, and a Discussion of the case by Dr. Joseph C. Bloodgood, Baltimore.

at the shoulder joint was done. Convalescence was rapid and uneventful.

On Feb. 21, 1924, the patient was perfectly well and 10 pounds heavier than his former weight.

On May 13, 1925, patient remains well and has further increased his weight.

PATHOLOGICAL REPORT[1]

Mr. P. H., S. 23., 196. #837-6. Gross specimen consists of left humerus 32 cm. long covered with periosteum and fragments of adherent muscle and tendon tissue; at the junction of the mid and lower thirds is a large fusiform swelling 13 cm. long by 7.5 cm. in diameter; this extends from within 5 cm. of the lower end of the bone to just above the mid-point of the shaft; the swelling is of hard bony consistency, faintly nodular on its anterior and posterior aspects with a roughly circular area on the latter 1.5 cm. in diameter bounded by a thin bony border and filled in with a translucent jelly-like substance, evidently representing a perforation of the bone from within; on manipulation a fracture is found through the swelling extending obliquely upward and outward across its anterior surface from the lower inner angle below to near the upper outer angle above, and thence backward and slightly downward along the lateral surface to the posterior border. On sawing the humerus in two and laying it open the fusiform swelling shows a large central cavity; this is bounded by a shell of bone 0.5 to 1 cm. thick continuous with the bony cortex above and below and is filled completely, except in its lower third, with a firm, elastic, friable, irregular grayish mass of firm semi-translucent tissue which seems to be continuous with the marrow above while it projects as a free rounded extremity into the empty lower third of the cavity below, thus resembling a ball and socket joint; the surface of this lower portion of the mass is roughened by numerous coarse granules of a translucent jelly-like consistency. The humerus above and adjacent to the swelling shows a thickening of the cortex up to 1 cm. with the marrow cavity correspondingly encroached upon but still present; the humerus below appears as a solid hard bone without marrow cavity. The picture presented suggests a tumor arising without marrow cavity, growing expansively outward, pushing the bony cortex outward to give the fusiform swelling described. Numerous sections are taken from various parts of the swelling for microscopic study.

Microscopic Examination. Sections from the main mass of the growth described as filling the central cavity show this to consist largely of a vascular areolar connective tissue with the cells small, narrow and spindle shaped, the intercellular substance a loose meshed network of delicate fibrils, and the vessels numerous, dilated and thin-walled. Scattered about in this connective tissue background in irregular fashion and in varying numbers are small irregular bone-like spicules, sharply outlined, pinkish or pinkish marked with blue zones and lines, and containing multiple oval or stellate spaces each with a palely staining cell. In other areas are somewhat larger irregular or more rounded masses more or less clearly outlined, and composed of a much paler staining, faintly bluish or pinkish homogeneous matrix punctuated with round or oval spaces partly filled each with a round pale reddish cell. In the centers of such masses the matrix is frequently less well formed consisting instead of a rather coarse network of filaments with open spaces containing the peculiar reddish cells described, while peripherally the masses may be incompletely circumscribed by narrow irregular bluish areas of beginning calcification. Throughout the sections are large foci of necrosis, which in some cases are infiltrated by deposits of blue granular lime salts. Sections through the free rounded end of the central mass show extensive necroses with marked surface hemorrhage; throughout the necrosed areas the peculiar large rounded pale reddish cells may be seen lying in a pale bluish disintegrated finely granular and fibrillar matrix. Sections through the translucent jelly-like nodules on the surface of this mass show these to consist of a blue staining faintly fibrillar tissue containing numerous large rounded or oval cells with moderately abundant fairly well outlined pinkish cytoplasm and

[1] By G. Y. Rusk, M.D.

relatively large rounded nuclei with a finely granular protoplasm; some of the cells are smaller, their cytoplasm more eosinophilic, their nuclei pycnotic. In certain areas the matrix is more homogeneous and slightly eosinophilic, while the contained cells lie free in spaces; within or adjacent to such eosinophilic areas are often smaller quantities of lime salts, deposited as irregular spicules. Foci of necrosis and hemorrhage are frequently present. Sections through the bony shell bounding the cavity described show numerous bony trabeculae laid down in fairly regular strata parallel to the surface; the trabeculae are bordered by a layer of large rounded or somewhat angular cells with slightly eosinophilic clearly outlined cytoplasm and fairly large rounded nuclei; the trabeculae further are separated and embedded in an abundant areolar connective tissue stroma. Externally the section is covered with a definite narrow layer of compact connecting tissue, the periosteum, while internally the surface is overlaid by a broad zone of the peculiar tissue described above, consisting of numerous large rounded reddish cells embedded in a bluish finely fibrillar matrix, here and there transformed into small areas of a more homogeneous, slightly eosinophilic tissue, marked occasionally by irregular lime salt deposits. At one point the invading tissue has extended out through the bony trabeculae to the periosteum, the zone of invasion appearing as a broad band of rounded cells in a bluish fibrillar matrix. On the inner free surface of the invading tissue areas of hemorrhage and necrosis are found. In none of the sections are any mitotic figures found.

Diagnosis. Chondroma of left humerus with pathological fracture.

DISCUSSION OF CASE REPORT[1]

In beginning this discussion I cannot do better than reproduce here an exact copy of my report made to Dr. Bullitt March 9, 1923.

Name: Mr. P. H., X-ray #5215.

Sent by: Dr. Jas. B. Bullitt, Garden City Bank Bldg., San Jose, Cal.

Diagnosis from X-ray and History. Bone tumor—humerus—shaft—middle and lower third. Healing bone cyst. Central chondromyxoma to be considered.

Clinical Note. W. M., 22. Pneumonia 4 yrs. ago. Following this indefinite pains in left arm. Diagnosis of neuritis. X-ray of spine negative. No examination of arm. Since that time, 4 yrs. ago, there have always been symptoms of pain and the function of this arm is not as good as the other. Three mos. ago noticed a slight gradual increase.

Examination. On palpation the tumor appears soft and at one or two points seems to fluctuate. Does not feel hard like bone.

Dr. Bullitt says the x-ray shows expansion of the cortex and the peculiar bone formation is puzzling.

Laboratory Examination. RBC 4,800,000. WBC 6,600. Wassermann negative. No Bence Jones bodies.

X-ray Examination—Bloodgood. The age of the patient at the time of the pneumonia was 18, and the most common central tumor at this age is the bone cyst. The most comon central tumor of bone at age 22 is the bone cyst. Also the giant cell tumor, chondroma, and myxoma. Central sarcoma is rare but possible.

The x-ray in this case is unusual. There is a distinct expansion of the bone shell occupying the lower third of the humerus and some of the middle third. There seems to be new bone formation in the marrow cavity above and below the tumor shadow and area of expansion. This is more common in the bone cyst, as I have never seen ossification in the giant cell tumor—chondroma, myxoma, or sarcoma. The bone shell varies in thickness, and projecting from the bone shell there is every evidence of periosteal bone formation. This is unusual in the bone cyst but possible. The markings of the central tumor suggest new bone formation in the bone shell or within the bone shell. In view of the new bone formation seen laterally from the bone shell it is quite possible that the peculiar markings are periosteal bone formation.

Metastatic tumor, especially the hypernephroma, must be considered. I think we can almost exclude the multiple myeloma appearing as a single tumor.

From this x-ray, in my opinion, there is but one thing to do. Explore under novocaine. I have described this in Minnesota Medicine and in a recent number of the Journal of Radiology. I am sending you reprints. If this proves to be a bone cyst curetting is sufficient. For all other types—for the giant cell tumor—curetting with the actual cautery is sufficient. But if myxoma, chondroma or sarcoma, and in my opinion there is generally periosteal involvement, there should be resection with a good margin of bone above and below followed by bone transplant.

If you are not prepared to make a differentia diagnosis burn out everything in the bone shell with the cautery, cauterization, swab out with pure carbolic and alcohol, being careful not to get the alcohol and cautery together, pack for ten minutes with a piece of gauze saturated in 50 per cent zinc chloride, close the wound without drainage, give x-ray treatment; and send the tissue to me for microscopic study.

Remember that the bone cyst and the giant cell tumor are cured by curetting only, but if this is sarcoma, chondroma or myxoma the tissue is probably in the bone shell and either at the first or second operation there will have to be resection.

Brief Summary of Case. The patient is a white male, aged twenty-two. Definite local pain in left arm with some slight restriction of motion has been present for four years. Swelling was observed for three months.

Roentgen Diagnosis. I have had considerable experience since I discussed this roentgenogram (Fig. 1) nine months ago. It still

[1] By Joseph C. Bloodgood, M.D.

remains a unique picture in the peculiar shadow of the bone shell which seems to show distinct new bone formation (later confirmed by gross and microscopic specimens).

I have recently reviewed roentgenograms of the benign bone cysts, the giant cell tumors, the central chondromas, the central myxomas, the central sarcomas, a few examples of central tuberculosis and the very rare Brodie's abscess, which have accumulated in the Surgical

FIG. 1.

Pathological Laboratory of the Johns Hopkins Hospital. The most striking feature is the absence of bone formation between the periosteum and the bone shell. There is not a single picture in which the bone shell resembles the one in this case. In a few cases of benign bone cyst and in all the cases of Brodie's abscess, and in some of the cases of localized tuberculosis of the shaft there has been some bone formation in the periosteal area.

Central sarcoma with intact bone shell and without infiltration of tumor tissue outside the bone shell is rare. In the Journal of Radiology for March, 1920[1] (Fig. 1) (Pathol. No. 19133) I reproduced a roentgenogram of a central myxosarcoma of the upper end of the humerus in which the roentgen shadow of the shell is somewhat like the one in Figure 1 here, and in that case tumor tissue was found outside the bone shell. In the same Journal (Fig. 15) (Pathol. No. 22016) there is a roentgenogram of a proved central sarcoma of the lower shaft and epiphysis of the femur in which the bone shell is smooth—entirely different from Figure 1—while in the same Journal, Figure 20 (Pathol. No. 14229) shows the roentgenogram of another sarcoma of the malignant hemorrhagic cyst type in which there is not a trace of bone formation outside the bone shell. In that article is a roentgenogram of every type of central bone lesion, except Brodie's abscess. The only types I failed to reproduce are those of the phalanges, metacarpals and metatarsals. These are pictured in a later article.

The point I wish to make is that the roentgenogram in Figure 1 should have made one suspicious that the tumor was of an unusual type and that chondro- or myxosarcoma should be considered.

The operator and pathologist in this case must have had this in mind, because at the exploratory incision it was diagnosed myxosarcoma and amputation performed.

Clinical and Roentgen Diagnosis. The age of onset—eighteen years—or even twenty-two, would not exclude a bone cyst which with the rarest exceptions occurs in the shaft. The most common central tumor between the ages of twenty and thirty is the giant cell tumor, but this is very rare in the shaft. In my recent studies of 200 cases of giant cell tumor only 3 occurred in the shaft. The combination, therefore, of the age of the patient and position of the tumor would be against both cyst and giant-cell tumor.

The position also, I think, would rule out a tuberculous abscess or Brodie's abscess. One would think of chondroma, myxoma, or a sarcoma associated with one of these two tissues. The expansion of the bone shell would rule out periosteal sarcoma of the destructive type. In this type there is often a central shadow not unlike a primary central lesion, but there is no expansion of the bone.

Method of Attack. First, it must be borne in mind that any type of sarcoma of bone is rarely cured by amputation. In my own list of cases there is not a single example of a per-

[1] Diagnosis and treatment of benign and malignant tumors of bone. *J. Radiol.*, 1920, i, 147.

manently cured sarcoma of a bone of the upper extremity by amputation, and only about 8 to 10 per cent of cures after amputation for lesions below the middle third of the femur.

In a case of this kind roentgen rays or radium could first be tried, or a resection and bone transplantation could be done, or one could explore and resect, if sarcoma or myxoma—and I am inclined to think it would be safer to resect in case it is found to be a chondroma.

You will note that in my original note of March 9, I advised exploration and resection unless a benign bone cyst was revealed. With my added experience today, nine months later, and with more time for restudy and thoughtful consideration of the evidence, I am inclined to believe that if a similar case presented itself, I would resect and transplant bone. This I have recently done for lesions in the lower end of the humerus.

Brief Review of Chondromas. The most striking feature in this benign connective-tissue tumor is the transplantability of the tumor tissue. If in the exploration of a joint cartilage is removed and a piece of cartilage left in the wound, it ultimately disappears. Up to the present time I have never seen a chondroma which could be explained by the transplantation of joint cartilage. With rare exceptions in all chondromas, periosteal and central, which have been explored and when during the operation tumor tissue was scattered in the wound, one or more recurrent tumors have formed, leading to secondary operations and in many cases to amputation. This is also true of myxoma. But the recurrent myxomas have ultimately killed the patient through metastases, while the recurrent chondromas do not cause death.

Common Situation of Central Chondroma. In my list of bone tumors central chondromas are most common in the phalanges of fingers, next in the metacarpals, the remainder are scattered. They are more apt to occur in the shaft than in the epiphysis. They are easily explained by islands of displaced cartilage. Quiescent small areas of cartilage have been found at autopsy. When Virchow found his first case in the upper shaft of the humerus, he formulated his view, which later proved to be incorrect, that bone cysts were due to cystic degeneration of chondromas.

Chondromas are much more frequent than myxomas as central lesions—at least fifteen to one, but like the dermoid cyst of the soft parts, chondroma must be always considered as a possibility.

Curetting for Central Chondroma. I will not consider here periosteal chondroma. The central chondroma in the lower end of the femur reproduced in the Journal of Radiology for March 1920, (Fig. 15) (Pathol. No. 22016) was curetted by Dr. Charles Mayo in the Mayo Clinic in 1916 and radium introduced. There were two such treatments within one year. This patient is well today (1923), seven years later. I do not know whether the tumor was removed completely or whether thermal or chemical cauterization was used, but I know the patient is clinically well with a healed wound and with good function. The roentgen ray, however, does not show complete ossification. I have curetted in four instances central chondromas of the phalanges and one of a metacarpal. In every instance, on opening the bone shell, I removed the cartilage tumor with the electric cautery, followed by carbolic and alcohol, and then 50 per cent zinc chloride. These patients have all been followed, clinically and by roentgen examination; there have been no recurrences, and roentgen examination shows complete ossification.

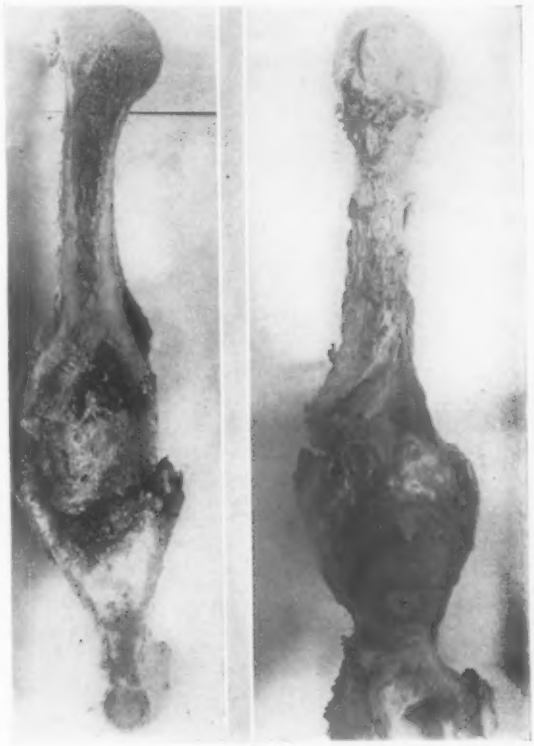

FIG. 2

The most interesting feature in the present case (Fig. 1) is the study of the bone shell. What we would like to know is this: Has cartilage tissue perforated the bone shell? I know this tumor can produce perforation.

Is this new bone formation in the shadow and this typical irregular picture of the bone shell

a sign of tumor perforation? If so, it would mean that curetting cannot be done, because tumor tissue would be left behind, and if the bone shell were destroyed with the cautery, a resection might as well be done.

The photograph of the specimen (Fig. 2) sent to me, strongly suggests that cartilage has perforated the bone shell, and I trust Dr. Bullitt in his report will establish this fact.

Conclusions. The most significant and essential feature of this case is that it suggests an endeavor to come to a conclusion from the clinical picture alone which will allow one to proceed with a deliberate resection and bone transplantation, or an amputation without an exploratory incision. In a number of cases I believe this can be done. In a number of cases it cannot. Perhaps with a larger experience and constant restudy deductions helpful to a correct method of attack may be formulated.

In my opinion this boy's arm could have been saved by a deliberate resection and bone transplantation. However, we must bear in mind that the tradition and the rule of surgery throughout the world has been in favor of amputation for *all* bone tumors, unless they are essentially and readily recognized as benign. To combat this there must be accurate clinical, roentgen-ray and pathological knowledge, and courage to act on it.

To those with less experience the most helpful information is, that sarcoma is rarely cured by amputation, so if there is any doubt, *don't amputate.*

Summary, Final Note.—June 23, 1925. Recent experience since the above was written has taught me that we must look out for the unexpected myxoma and chondroma. Practically the only central sarcoma with an intact bone shell and without periosteal involvement arises in a pre-existing myxoma or chondroma.

The case reported here in my series is unique, because the bone shell is different from almost every other bone shell of a central tumor of which we have roentgenograms. To repeat, it occupies the shaft of an adult under twenty. In this position at this age bone cysts predominate, but the roentgen picture was not that of a bone cyst. I have just had a roentgenogram of a central myxoma in which the bone shell with its new bone formation and honeycombed appearance closely resembles this case.

If the central tumor of the shaft is in an adult over twenty always think of myxoma or chondroma.

REPORT OF A CASE OF EXTENSIVE GENERALIZED SKELETAL METASTASES FOLLOWING PRIMARY CARCINOMA OF THE BREAST

BY A. J. BENDICK, M.D., AND A. W. JACOBS, M.D.

Montefiore Hospital

NEW YORK CITY

THE rare occurrence of such extensive involvement of the osseous system following carcinoma of the breast, is the reason for reporting this case. In a fairly extensive cancer service, this is the first case we have seen with metastases in the metacarpal bones and phalanges. Such cases are also very rare in the literature.

S. S., female, housewife, aged thirty-nine, born in Austria; was admitted to Montefiore Hospital, January 14, 1925, with the following history:

FIG. 1. Shows the extent of metastatic invasion, involving not only the cortex but both jaws and cervical spine.

FIG. 2. Shows the lesion in the dorsal and lumbar spine and pelvis. Note also the extensive rib involvement.

Married twenty years, 5 children alive and well, oldest eighteen years, youngest six and a half years. All breast-fed except the last.

Present history dates back to four and one-half years ago, when patient noticed a painless lump in right breast, about the size of a walnut. About two and one-half years ago, a physician was consulted on account of pains in arms and legs and sticking pains in the chest. The mass in the breast was recognized and operation advised. Right mastectomy was performed with pathological report of carcinoma of breast with axillary metastases. Was discharged from the hospital two weeks later. One week later complained of pains in lower lumbar region, had to remain in bed on account of generalized pains all over her body, and was unable to walk; was becoming progressively weaker and losing in weight until her admission to Montefiore Hospital.

Physical examination showed an emaciated, cachetic adult, lying in bed, with apparently little pain. Teeth in poor condition. *Thorax*—deformed, funnel shaped with kyphosis, showing scar over right anterior chest (from mastectomy) with a few small hard nodules along scar in axillary region and left supraclavicular. *Lungs*—diminished expansion over right lung anteriorly, with depression over supraclavicular region, with dullness and bronchial

breathing. Scattered areas of diminished breath sounds over left and right. Posteriorly, dullness over left suprascapular region with bronchial breathing also over right apex. *Heart*—small in size, with systolic murmur over apex. *Abdomen*—distended, liver edge palpable at costal margin. Spleen not palpable. *Skin*—several hard nodules present in skin over right lateral chest wall in axilla and left anterior chest in midaxillary line below the free ribs. *Skeletal*—both humeri show periosteal irregularities, thickening and tenderness; ribs also show irregularities and tenderness. Tenderness also over sixth and seventh dorsal vertebrae.

FIG. 3. A good demonstration of the extreme multiplicity of the lesions in both humeri, both shoulder girdles and the bony thorax.

Neurological examination showed ptosis of left eye, definite facial palsy of cerebral origin, pupil of right eye failing to respond. Blood examination showed secondary anemia with W.B.C. 9800, polymorphonuclears, 49 per cent; lymphocytes, 39 per cent; large lymphocytes, 10 per cent; transitionals, 2 per cent; Wassermann reaction, negative. Urine showed presence of albumen, few R.B.C. and many pus cells, no Bence-Jones albumose.

On March 1, patient developed suddenly pathological fracture of right humerus, and nine days later also fracture of shaft of left humerus. Two weeks later, pathological fracture of right femur. General condition grew progressively worse until death which occurred April 10, 1925. Permission for autopsy was refused.

Roentgen examination of the patient showed the following:

Skull: Practically the entire cortex had been replaced by large metastases, no normal bone being seen. A similar process was seen in the lower jaw (Fig. 1).

Spine: All the vertebrae from first cervical to fifth lumbar showed a very extensive involvement with partial collapse of fifth, seventh, eighth, tenth, twelfth dorsal and first lumbar (Fig. 2).

Pelvic bones showed marked deformity, being studded with metastases.

Both femurs showed very extensive involvement, and the right developed a pathological fracture.

Chest: There was a partial collapse of the thoracic wall on both sides due to the very extensive involvement of all the ribs. In the region of this collapse there was seen some pleural thickening. The clavicles and scapula also showed very marked involvement, this extending down even to the body of the scapula which showed marked enlargement and rarefaction of the bony struc-

FIG. 4. Roentgenogram taken after pathological fracture of humerus.

ture. Both humeri from end to end, showed metastatic replacement (Fig. 3).

Roentgenogram taken March 2, 1925, showed a pathological fracture of the right humerus and nine days later a fracture of the left humerus (Fig. 4).

The right radius showed involvement over the upper 3 inches and a few small foci at the lower end near the articular surface (Fig. 5).

The right ulna showed a lesion just below the articular surface and a few small punctate metastases about 2 inches below this.

The left radius showed an extensive involvement over the upper 2½ inches with a few small foci extnding down throughout the shaft. The lower end showed a rather large tumor mass, involving the lower inch (Fig. 6).

The left ulna showed a few small lesions scattered throughout the length of the bone.

FIG. 5. Shows metastatic involvement of lower half of right humerus and upper portion of right radius and ulna.

FIG. 6. Shows metastases in the region of the left elbow.

The hands are the most interesting, owing to the extreme rarity with which they are involved in breast carcinomatosis.

Right Hand: There was a fairly large metastatic nodule in the proximal phalanx of the

third finger, about one-half inch from the metacarpal articulation. The proximal one inch of the third metacarpal bone also showed a very extensive involvement. The fourth finger showed several small areas in the middle and proximal phalanges. The fifth finger showed an involvement of the proximal phalanx and metacarpal bone (Fig. 7).

Left Hand: The first metacarpal showed a small metastatic nodule. The second metacarpal showed three small metastases and a small area in the proximal phalanx. There was a small nodule in the terminal phalanx of the third finger. The fourth finger showed a small nodule in the proximal phalanx. The semilunar bone showed metastatic invasion (Fig. 8).

FIG. 7. Shows the metastases in the phalanges and carpal bone of right hand.

FIG. 8. Shows the destructive lesions in phalanges metacarpal bones and lower end of radius of left hand.

OBSTETRICAL ROENTGENOLOGY WITH SPECIAL REFERENCE TO ANENCEPHALY*

BY HOWARD P. DOUB, M.D.

From The Department of Roentgenology, Henry Ford Hospital
DETROIT, MICHIGAN

THE science of roentgenology embracing, as it does, every branch of medicine has naturally progressed much more rapidly in some branches than in others. Obstetrical roentgenology, by its very nature has been a laggard in this development, being retarded by the lack of physical instruments necessary for rapid exposures and brilliant roentgenograms. The fear, in some quarters, of causing damage to the fetus has also acted as a deterrent. With the use of the modern intensifying screens and superspeed duplitized films requiring only a few seconds' exposure, it would seem that this fear is unjustified, especially since no cases of injury have appeared in the literature despite the many examinations made of these patients. Case[3] and many others are positive that no ill effects are seen from these examinations.

In the last few years this branch of roentgenology has shown a decided impeuts, and in many clinics it is now almost a routine procedure in all cases suspected of variation from a normal pregnancy either from the standpoint of the fetus or of the bony conformation of the maternal pelvis. From this standpoint there is no method which so well visualizes these structures and enables the comparison of the relative size of the fetal head and the pelvic opening.

In considering this subject one must not lose sight of the fact that this is one of the positive signs of pregnancy after four and one-half months. Occasionally parts of the fetal skeleton can be shown earlier than this but a negative finding before this time may prove later to be incorrect. We wish to emphasize the fact that films made in the lateral and semilateral positions will often show the fetal structures quite clearly in cases where they are difficult of demonstration in the anteroposterior position. For several years we have routinely examined these cases in both the anteroposterior and lateral or semilateral positions and in many cases we could make a positive diagnosis from the film made in the lateral position where it would have been missed in the other position. The roentgen examination is also of value in pseudocyesis both as an aid to diagnosis and in convincing the patient that pregnancy is not present. Case after case could be quoted where this situation has been easily cleared up in this manner.

From the point of view of teaching, this work has great possibilities both from the standpoint of the medical student and the intern, and a collection both of the normal and of the abnormal conditions will be of great value.

Some of the deviations from the normal are the following: (1) Anencephaly; (2) fetal death; (3) hydrocephalus; (4) abdominal pregnancy; (5) multiple pregnancy; (6) malformations of fetal skeleton; (7) changes found by pelvimetry, and (8) changes found by pneumoperitoneum.

ANENCEPHALY

Anencephalic monsters are found with considerable frequency in any large obstetrical service and are usually associated with some deviation from the normal course of pregnancy. A marked increase in the amount of amniotic fluid is frequently seen. Browne[1] in 1920 gave a good description of the anencephalic syndrome which will be briefly summarized as follows: "(1) Maldevelopment of the basis cranii, with the characteristic absence of the pituitary gland. (2) Protruding eyeballs are invariably present and are caused by the smallness of the orbital cavity together with its triangular shape instead of being round. (3) The aquilinity of the nose due to an increase of the subcutaneous fat between the skin and the nasal bones and

*Read at the Sixth Annual Meeting, Central Section, American Roentgen Ray Society, Detroit, Mich., Feb. 19–21, 1925.

also due to the maldevelopment of the frontal bone. (4) The protruding tongue due, not to enlargement of the organ, but to smallness of the mouth cavity. (5) Increase in the subcutaneous fat, together with hypopituitarism and hypoplasia of the genital organs constitute the syndrome described by Froehlich in 1901. (6) Enlargement of the thymus gland. (7) The suprarenal glands are always very small or absent in anencephaly. (8) Hypoplasia

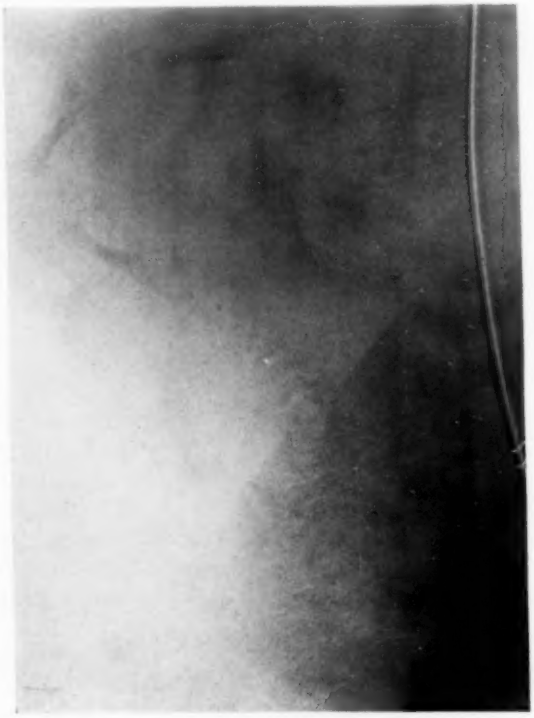

FIG. 1. Case 1. Roentgenogram taken in lateral view showing anencephaly and spina bifida of the fetus.

of the genital organs. These may appear normal to the naked eye but microscopically they always show underdevelopment. (9) Stunting of the growth. The measurements of the various parts of the body are less than in the normal fetus in the same period of development." To these should be added the fact that in practically every case reported there has been a spina bifida extending from the skull downwards for a varying extent. In one of our cases (Case 1) we were able to demonstrate not only an anencephaly but also spina bifida previous to birth. No previous mention of the demonstration of the latter before birth has been found in the literature.

Barlow[2] examined 4 cases of anencephaly post mortem and found the anterior portion of the pituitary gland resting on the body of the sphenoid. In no case was there any real attempt at formation of the sella turcica. He concludes, therefore, that the other features of the condition are not due to apituitarism and disputes the theories of Browne.

Two of the cases below have been examined by Dr. F. W. Hartman who found definite evidence of pituitary gland tissue thus confirming the work of Barlow.

Case[3] reported the first case of anencephaly in 1917 and since that time an increasing number of reports of this condition have been appearing in the literature. Campbell and Willits[4] report a roentgen-ray diagnosis of anencephaly before birth in a case which showed clinical evidence of hydramnios. The fetus lived four hours after delivery. Spangler[5] reported two cases diagnosed before birth by means of the roentgen ray. One of these cases was referred because of hydramnios and the other because of toxemia and a cessation of the progressive enlargement of the uterus.

CASE REPORTS

Case 1. Mrs. C. N., aged twenty-six, white, primipara, married three years. Family history—negative. A previous physical survey resulted in the following diagnosis: Chronic tonsillitis, cysts of ovaries, infantile type uterus, adenoma of thyroid.

The menstrual history was negative. No miscarriages. Onset of last period May 8, 1923. Wassermann reaction—negative. Blood pressure—normal. Urine—negative. At various times the patient complained of pain in the lower abdomen and pelvis. Physical examination on January 2, 1924, disclosed slight edema of ankles. The uterus was enlarged more than is usually seen at term and fetal parts could not be palpated with any degree of certainty. Because of hydramnios the patient at this time was referred to us for roentgen-ray examination.

We reported a well-advanced pregnancy. There was a definite spina bifida of the cervical and upper dorsal vertebrae with nondevelopment of the vault of the skull. The rest of the bones were well developed. Impression: Anencephaly and spina bifida.

The following day, before the patient could be brought in for induction of labor, the membranes ruptured and a large quantity of amniotic fluid was passed. The delivery was somewhat delayed by the passage of the enlarged shoulders, which is a constant finding in these monsters. The fetal heart beat very feebly and the baby died without breathing.

The fetus was a female 34 cm. in length, weighing 1375 grams. It was a typical anencephalic monster of approximately 7½ months negative except for moderate general thyroid enlargement. There was moderate hydramnios.

On July 23 there was spontaneous rupture of the membranes with induction of labor. Roentgen examination at this time revealed malformation with lack of development of the skull. The remaining bones appeared to be normal. Impression: Anencephalic fetus.

Discussion: A case of anencephaly diagnosed before birth by means of roentgen-ray examination. Hydramnios was present.

FIG. 2. Case 1. Roentgenogram of the fetus after delivery.

with a meningocele of the cervical and upper dorsal region.

Discussion: The unusual findings from a roentgenologic standpoint is the demonstration before delivery of spina bifida in addition to anencephaly. The primary reason for roentgen-ray examination was hydramnios.

Case II. Mrs. E. B., aged twenty-nine, white, primipara, married seven years. Family history—negative. Menstrual history—normal. No previous pregnancies.

Present pregnancy. Onset of last period November 26, 1923. Wassermann reaction negative. Urine—negative. Physical examination

POSTMORTEM FINDINGS (DR.F.W.HARTMAN)

Body: The body is 37 cm. long and weighs 1610 grams. The skin is livid purple. The convex parts of the cranium are absent. In their place a thin, soft, bloody mass covers the base of the skull. This defect is roughly circular and its borders are as follows: Anteriorly the line runs along the front 7 mm. above the orbital cavities; laterally on both sides the border line turns down and backward 1 cm. distant from the ears; posteriorly it follows the fold between cranium and shoulders. The skin all around this defect is hairy. Both ears are large, protruding and puffed into the form of muscles. The eyes

are markedly protruding; the pupils are not recognizable; the conjunctivae are reddened. The nose is flat with small slit-like nostrils. The mouth is wide open forming a circle 2 cm. in diameter. In the hard palate there is a slit-like depression running into the nasopharynx, but the jaw appears normally developed. The neck is obliterated, the head appearing implanted directly on the torso between the shoulders. Chest, abdomen, upper and lower extremities and external genitalia show no deviations from the normal.

The *thyroid* is normally developed, each lobe measuring 2 × 0.8 × 0.7 cm. The *thymus* is

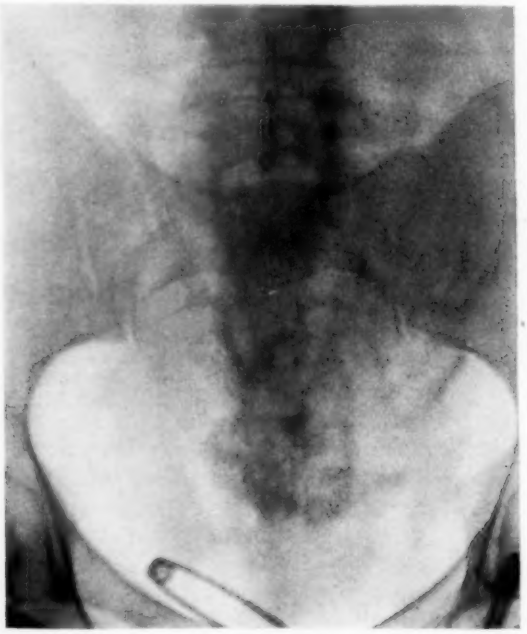

FIG. 3. Case II. Roentgenogram before delivery showing anencephaly.

large consisting of two joined lobes. The lower ends are rounded. The gland is dark yellow, 7 cm. long, 2 cm. wide at base and of an average thickness of 8 mm. The *lungs* are small, dark blue and airless. Their consistency is that of muscle. The *pericardium* and *heart* are of normal appearance. The *liver* is of normal size and weighs 80 gm. It measures 13 × 8 × 3 cm. The *spleen* is large, elongated, dark blue, weighing 20 gm. and measuring 9 × 3 × 1.5 cm. The *pancreas* is of normal appearance. The *adrenals* are very small and of lemon-yellow color. In size each resembles the half of a navy bean. The *right kidney* is of normal size and form measuring 4 × 2 × 2 cm. The *left* is much smaller, being only about one-half the size of the other. It measures 2.5 × 1.5 × 1 cm. The surface of the right kidney is normal while that of the left is roughly granular with small cystic protuberances in the cortex. The *urinary bladder* shows numerous petechiae in its mucous membrane. The umbilical vessels and urachus are normally developed. The genitalia show no abnormalities. The alimentary canal is normal.

Anatomical Diagnosis. 1. Acrania. 2. Hypoplasia of adrenals. 3. Cysts in left kidney.

Case III. Mrs. K. Y., aged thirty-one, white.

Pregnancy progressed normally for five and one-half months. Wassermann reaction, negative. At this time abdominal pains came on and the patient was brought into the hospital. Fetal heart sounds could not be heard. The following day a monster showing anencephaly and a meningocele of the upper spine was delivered. Roentgen-ray examination was not made previous to delivery.

Roentgen examination of the fetus following delivery showed a typical anencephalic monster wth spina bifida of the upper cervical spine.

Pathological Note: Female, weight 363 gm., length over all 22.5 cm. The fetus is a typical anencephalic with meningocele of upper portion of vertebral column. The brain appears to be partially developed.

Case IV. Mrs. E. S., white, aged thirty-six.

The pregnancy showed no unusual findings except that the mother was very obese. Wassermann reaction, negative. During the eighth month some hydramnios was noted. About this time the membranes ruptured and the patient was brought to the hospital where a still-born anencephalic monster was delivered. Roentgen-ray examination was not made previous to delivery.

Roentgen examination of fetus showed a typical anencephalic monster with spina bifida of cervical vertebrae.

Pathological examination disclosed evidence of pituitary gland tissue; hypoplasia of thyroid and suprarenal glands; hyperplasia of thymus.

Case V. Female, white, aged thirty-one.

About the sixth month irregular abdominal contractions set in. The patient was brought to the hospital and examination showed evidence of hydramnios. A still-born anencephalic monster was delivered the following day. No roentgen-ray examination was made. At delivery 4 to 6 liters of amniotic fluid was found.

Marked degree of anencephaly with incomplete closure of the tissues over the spinal column down as far as the sacral canal. Female, weight 675 gm., length 27 cm.

Roentgen-ray examination of the fetus showed a small anencephalic monster.

Pathological examination disclosed pituitary gland tissue present.

Cases VI and VII. Seen during 1922 in Detroit Receiving Hospital. These were referred by Dr. Walter Welz of the Detroit Board of Health. These cases were delivered of anencephalic monsters and were diagnosed roentgenologically before birth.

DEATH OF FETUS

Spalding[6] seems to have made the first observation of the overlapping of the fetal bones as a pathognomonic sign of intrauterine death. He observes as follows: "With the X-ray, the decreased size of the foetal head, from post-mortem shrinking can be determined because the cranial bones remain nearly the same size and shape. As the head shrinks the bones overlap at times to an astonishing distance. The radius of curvature of the shrunken head becomes obviously smaller than that of the unchanged cranial bones. When both the above changes are noted in the X-ray picture it seems justifiable to conclude that the child is dead and such has been our experience in the X-ray studies of 21 babies in utero."

We have had two cases which showed this overlapping of the cranial bones and both fetuses were born dead. The macerated condition of both gave evidence of a considerable period of intrauterine death.

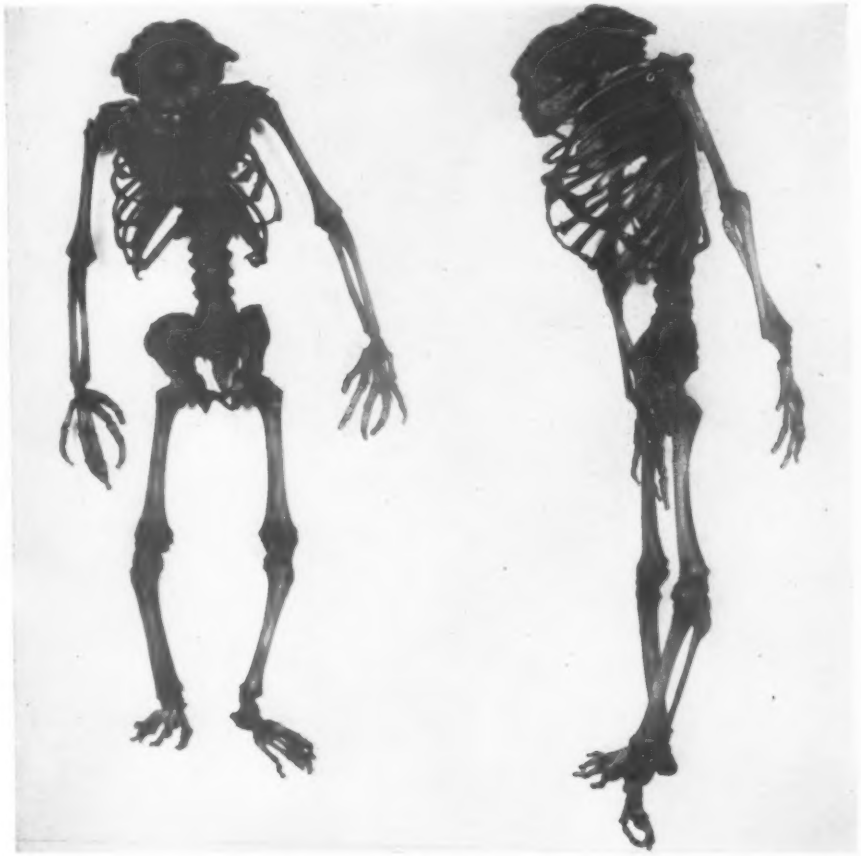

FIG. 4. Case II. Photograph of skeleton of the fetus showing characteristic deformity.

We have also had one case of tubal pregnancy which beautifully demonstrated these findings. This was a case of fetal death at about the third month and removal by operation some months later.

Case VIII. Mrs. E. D., aged thirty-two, white, primipara.

The previous history is unimportant. The menstrual history was negative and there were

no previous pregnancies. Wassermann reaction, negative. Urine, negative.

During the six months of pregnancy the patient complained of some dyspnea and palpitation of the heart and there was a moderate edema of the lower legs. A slight trace of albumen appeared in the urine at this time. The patient was put in bed and fluids restricted but the condition showed no improvement. About this time some moisture was found in the lungs and she was referred for roentgen-ray examination of the chest and also in regard to pregnancy as it was decided to induce labor the A moderate-sized fetus was present and showed size of the skull diameter. Shortly after this the patient was delivered of a nearly full term macerated fetus.

HYDROCEPHALUS

The question of the possibility of hydrocephalus is obviously of paramount importance and to be forewarned will greatly aid the obstetrician. We feel that in practically all cases of well-developed hydrocephalus the condition can be foretold by roentgen examination. In cases where the head is some distance from the film

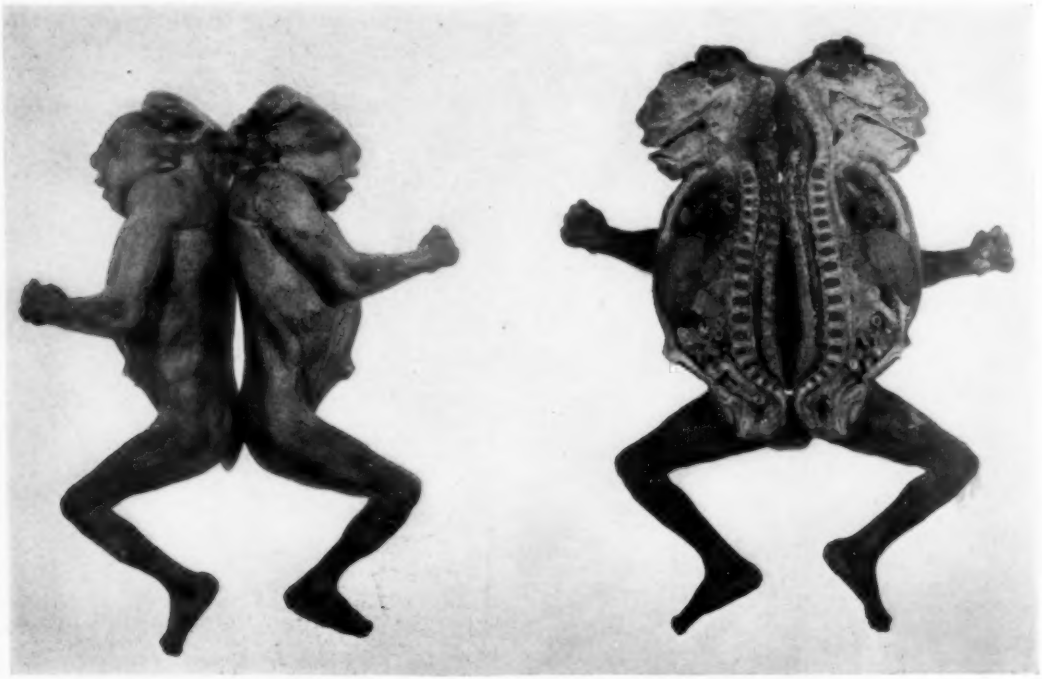

FIG. 5. Case v. Photograph of fetus after section.

a breech presentation. There was overlapping of the cranial bones with an unusual radius of curvature.

The patient was delivered a few days later of a macerated fetus. The maceration was of such degree that little traction was required to separate the legs from the body.

Case IX. Mrs. C., white, primipara.

The pregnancy progressed normally until the eighth month when the fetal heart could no longer be heard. Roentgen examination at this time showed no abnormality of the cranial bones.

One month later a second roentgen examination showed definite overlapping of the cranial bones with marked diminution in the one occasionally is mistaken because of the projected head being enlarged on the film. However, if the films are made in several positions the relative distances of the fetal parts can usually be determined and allowances made for these differences.

Case X. Mrs. L. H., aged thirty, white, one previous pregnancy. Menses have always been irregular. There was a moderate enlargement of the thyroid. The pregnancy progressed with no abnormal findings until the seventh month. A roentgen-ray examination at this time showed a breech presentation. The skull was not thought to be unduly large.

During the ninth month a large mass was felt in the region of the fetal head and a second roentgen examination showed a definite hydrocephalus with a breech presentation.

A few days later the patient was delivered. There was a large hydrocephalus and a meningocele in the dorsal region.

EXTRAUTERINE PREGNANCY

The treatment of this condition is surgical and is usually carried out as soon as the diagnosis is confirmed. The high percentage of mortality resulting from hemorrhage in these cases makes an early diagnosis of the utmost importance. In those cases past the middle of pregnancy we believe that the roentgen examination would be of the utmost assistance to the obstetrician.

Lee[7] reports a case of advanced extrauterine pregnancy with a living child in which the diagnosis was cleared up by roentgen examination. In this case the fetal head was up under the costal arch and the breech at the level of the iliac crest. The left arm of the fetus extended over the right side of the mother below the liver. We have not observed a similar case.

MULTIPLE PREGNANCY

A definite diagnosis of multiple pregnancy and the relative position of each fetus can be made in all cases in the latter months of pregnancy, and we have several cases showing twins as early as four and one-half months. In cases of suspected hydramnios where differential diagnosis has to be made between this, with or without monstrosity, and twins the roentgen ray is usually suprisingly accurate.

In these cases plates should be made as near delivery as possible so that the position of either fetus likely to cause obstruction at the time of delivery can be changed.

FIG. 6. Case VI. Roentgenogram showing anencephaly before delivery.

ABNORMAL FETAL DEVELOPMENT

As the technique in this field is improved it will be possible to discover malformations such as absence of the smaller bones. Anencephaly, as quoted above, can be diagnosed in most cases, and in a certain

percentage of cases spina bifida should be recognized. Achondroplasia should be discernible, if far enough along in development. One case of twin monster has been seen by the writer. The presence of endocymic monsters has been observed by most roentgenologists.

PELVIMETRY

Owing to the complicated methods necessary for this work the procedure has not come into very general usage although there would seem to be a very definite field for it especially in cases of pelvic deformity. In those cases of contracted pelvis both the inlet and outlet may be measured. All cases with pelvic deformity should be examined in the late months of pregnancy so that the relative size of the fetal head and the pelvic opening can be compared. Chamberlain and Newell[9] have described a mathematical method of calculating the diameters of the pelvis which is relatively simple and quite accurate.

PNEUMOPERITONEUM

It is scarcely within the scope of this paper to consider pneumoperitoneum as applied to obstetrics since this is a distinct chapter in itself. It is nevertheless a method which will show uterine enlargement in its earliest stages even before any fetal bones can be seen. By this means pelvic tumors can be differentiated from the uterine enlargement of pregnancy. Van Zwaluwenburg[8] claims that the pregnant uterus can best be shown between the sixth and sixteenth weeks. Before the sixth week the uterine changes are so slight as to escape attention and after the sixteenth week the uterus extends out of the pelvis into the abdomen.

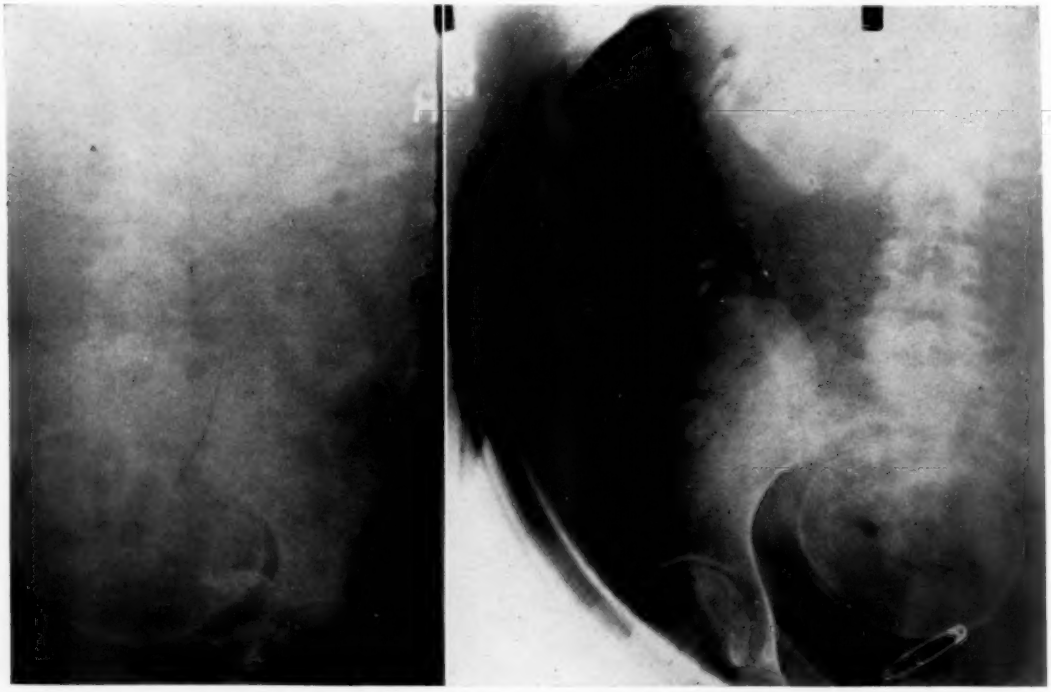

FIG. 7. Case IX. Roentgenograms taken one month apart showing the change in skull after fetal death.

By this method we have observed a pregnancy occurring in one horn of a bicornate uterus. A normal child was delivered at term by caesarean section, and the presence of the bicornate uterus confirmed.

SUMMARY

1. Seven cases of anencephaly are reported. Four of these were diagnosed roentgenologically before delivery. Spina bifida was also diagnosed in one of these 4 cases.

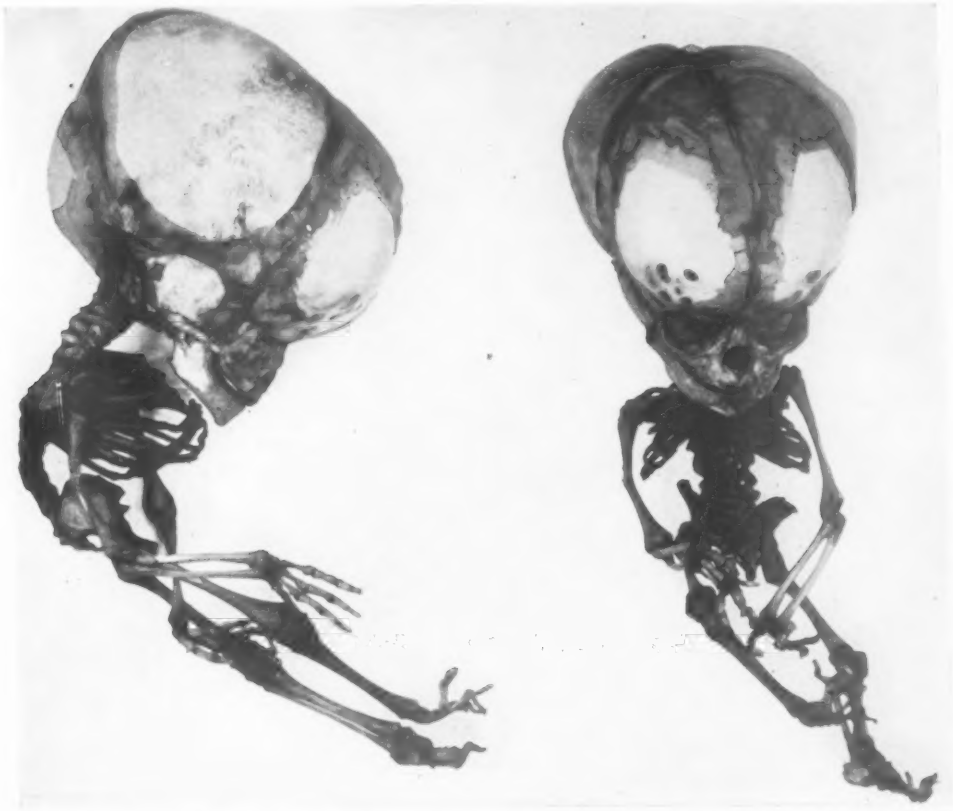

FIG. 8. Case x. Photographs of skeleton of fetus showing hydrocephalus and other deformities.

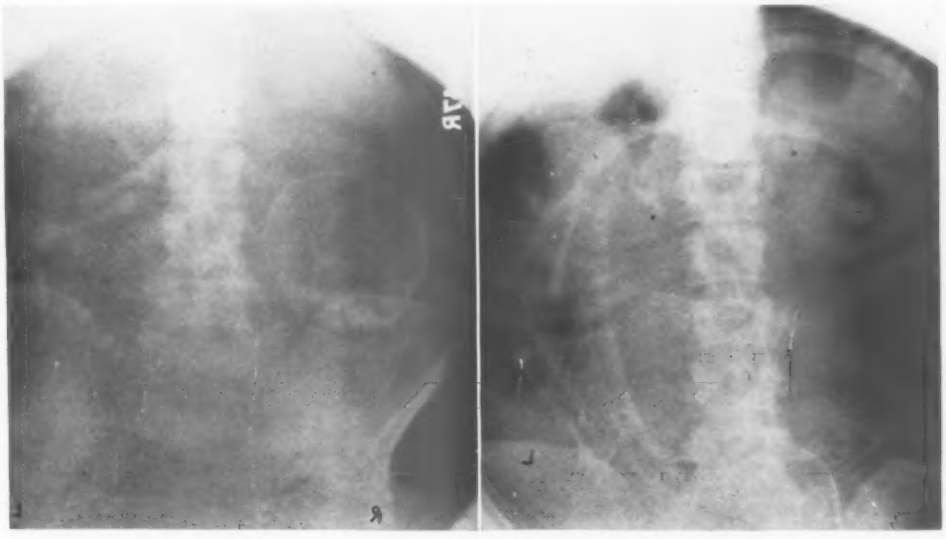

FIG. 9. Roentgenograms showing fetus in transverse position which changed spontaneously to vertex between exposures not more than ten minutes apart.

2. Two cases of intrauterine fetal death with the characteristic roentgen-ray findings are discussed.

3. A case of hydrocephalus is reported.

4. A number of other abnormalities of pregnancy as seen by roentgenological examination are discussed.

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Information of interest to all readers will be found on page iii. Lists of officers of The American Roentgen Ray Society and The American Radium Society will be found below.

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EDITORIALS

THE NEW SECTION ON RADIOLOGY

AMERICAN MEDICAL ASSOCIATION

The final creation of a separate Section on Radiology in the American Medical Association will be hailed as a distinct step in the progress of our specialty. It is, in fact, the first official recognition on the part of a national organization that radiologists occupy a position on a par with the other medical specialties. It gives to the roentgenologist an official standing which he has never before enjoyed. We have long felt that such recognition is deserved and justified, especially on the ground that all of the important advances in roentgenology have been made by specialists in this field. Progress in the future will come, in all probability, from the same source.

The results of this recognition may be very far-reaching. Roentgenology is now officially an integral part of medicine and as such it should be taken for granted that it may be practised only by regularly licensed physicians. It is an anomalous condition that forbids the administration of deadly drugs by those not licensed to practice medicine but permits the use of so dangerous an agent as the roentgen ray by any person who cares to procure the apparatus. Of late even "beauty parlors" are using a small roentgen-ray outfit for the removal of superfluous hair, and it is doubtful if there is any legal way to prevent such use. We shall have more to say on this subject in the future, especially about the standard of business ethics that permits the wide-spread distribution of roentgen-ray apparatus to such people for such a purpose.

This is only one of the many abuses that cry for abatement in the field of roentgenology. Some of them may be eliminated by proper amendment of the medical practice acts and others only by the slow process of education of the medical profession.

There is no doubt that we are now in a stronger position than heretofore to carry forward efforts in both of these fields because of the recognition of roentgenology as a medical specialty by the American Medical Association.

PROGRESS IN MEDICAL LICENSURE

The fact that each State in the Union requires separate licensure for the practice of medicine within its borders has been the cause of much inconvenience and hardship to a great number of medical graduates. This evil has been somewhat lessened as the years have passed and the number of States has increased which reciprocate by accepting each other's requirements. Reciprocation, however, would never be an ideal plan even if all the States should finally adopt it, since it would tend to lower the requirements for the practice of medicine to that of States having a low standard.

The way out of the difficulty has been in sight for several years as the number of medical graduates receiving the certificate of the National Board of Medical Examiners has increased. When all the states have finally accepted the certificate of the National Board it will be a long step toward a uniform requirement for medical licensure throughout the United States.

A recent number of the Bulletin of the American Medical Association (May, 1925, xx, 135) has the following hopeful announcement on this subject which it quotes from the Bulletin of the National Board:

THE CERTIFICATE OF THE NATIONAL BOARD OF MEDICAL EXAMINERS

"The state boards of medical examiners of Michigan, Oklahoma and Wyoming have recently passed resolutions authorizing the acceptance of the certificate of the National Board of Medical Examiners for medical licensure. The state board of Michigan reserves the privilege of reviewing the full credentials of

each candidate for licensure who holds the certificate of the National Board. Applicants for licensure in Wyoming who hold the National Board's certificate will be given an oral examination.

This favorable action by the three state boards mentioned brings the total number of states now accepting the National Board's credentials up to thirty-one, in addition to the Territory of Porto Rico and the Military Reservation of the Canal Zone. The states are as follows: Alabama, Arizona, Colorado, Delaware, Georgia, Idaho, Illinois, Iowa, Kentucky, Maine, Massachusetts, Maryland, Michigan, Minnesota, Mississippi, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, and Wyoming. In ten other states favorable legislation is now pending.—*National Board Bulletin.*"

THE VALUE OF ABSTRACTS

The readers of the journal will have noticed that we are publishing an increasingly large number of abstracts of articles bearing on roentgenology and radium therapy. Volume XIII which was completed with the June issue, contained 285 abstracts, occupying 103 pages of the Journal and representing 62 different medical journals in the English, French and German languages. A large amount of work is necessary to examine so many periodicals, to select proper articles for abstracting, to keep sufficient records so that no duplications will occur and no articles of importance will be missed, and finally to so abstract the article that its essential information will be conveyed to the reader. We are thoroughly convinced of the great importance of keeping our readers *en rapport* with all of the important work in our specialty in every part of the world and there is certainly no better way to accomplish this than to give them the gist of the world's literature on the subject. We wish our readers to understand that the abstracts in the Journal are not being done in a perfunctory manner but that every article is read and abstracted with the idea of thoroughly acquainting the reader with its essential contents. This may be done sometimes very briefly but at other times the abstract must be of considerable length. It is not always possible to convey all of the important information contained in the article, especially if there are tabulations, graphs, etc., but even in such cases we indicate to the reader what the article contains so that he may refer to the original if he so desires.

During the coming year we hope to so perfect our arrangements for abstracting that no article of any importance related to our speciality will be missed. We have already made arrangements for abstracting the Italian periodicals in addition to the German, French and English, and in the near future the Spanish journals will also be included in our list.

The index to Volume XIII contains references to all abstracts published in that volume under both the author's name and the title of the article. We are confident that in a short time we will attain our ideal, which is that the index of each succeeding volume of the Journal will be a complete index of the current world's literature on roentgenology and radium therapy.

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SOCIETY PROCEEDINGS, CORRESPONDENCE AND NEWS ITEMS

Items for this column solicited promptly after the events to which they refer.

PHILADELPHIA ROENTGEN RAY SOCIETY

THE Philadelphia Roentgen Ray Society held its regular meeting at the Pennsylvania Hospital on Thursday evening, May 7, at eight-thirty o'clock.

The scientific program consisted of a symposium on "Bone Tumors." The first paper, by Dr. H. K. Pancoast, was on "The Roentgenologic Classification of Sarcoma, with Comment on the Nomenclature of the Codman Committee," of which the following is an abstract:

The Registry of Bone Sarcoma instituted by the Committee of the American College of Surgeons, comprising Dr. Codman, Dr. Ewing and Dr. Bloodgood, is a momentous undertaking that should have the support and encouragement of every roentgenologist who comes in contact with cases of bone sarcoma. Every roentgenologist should be thoroughly familiar with the report presented by Dr. Codman[1] at the 1924 meeting of the American Roentgen Ray Society. The potential simplicity of the classification of malignant bone tumors suggested in this report brings joy to all of us and stimulates praise for the stupendous work of the Committee. It is a ray of sunshine through what has been a progressively darkening cloud of uncertainty and confusion.

Our only criticism of the Registry is the fact that the name of no roentgenologist appears on the Committee. We all realize the extreme importance of an accurate preoperative diagnosis in bone tumors, especially between malignancy and benignancy, and certainly it is upon the roentgenologist that the burden of correct diagnosis largely rests. It would seem as though the guiding mind of the roentgenologist would be essential in bringing the subject before his colleagues in such terms as would be understood by them and acceptable to them.

The attempt has been made in the past to interpret degrees of malignancy or even type of cell growth from roentgen-ray appearances. This custom probably arose largely from erroneous pathological interpretations, lack of accurate pathological knowledge and the lack of cooperation between pathologist, roentgenologist and surgeon. It is this lack of cooperation which the Registry is now trying to transform into close cooperation. Lack of cooperative experience has been responsible for innumerable incorrect diagnoses in the past. I am now showing students slides of giant cell tumors which nearly twenty years ago were diagnosed and treated as the most malignant types of central osteogenic sarcomas because the cortex of the bone had become so thinned as to give way and allow the tumor tissue to break through. In the old days we did not have the collective experience of Bloodgood and others to tell us that the benign tumor might sometimes do this.

We now know that many bone tumors, and especially sarcomas, are more or less complex as to their cellular constituency, that cells may change relatively from time to time, and vary in different portions of the growth and become simple or single celled only in their metastases. The roentgenologist now realizes that he should not attempt to designate sarcomas by their cellular constituents as round cell or spindle cell tumors, but should leave this for the pathologist to determine. He should interpret only general types of sarcoma which conform to certain definite characteristic appearances, and possibly designate a certain apparent degree of malignancy if further experience shows that this is permissible.

We are very happy to state that the suggested classification of sarcomas by the Registry Committee meets with our hearty approval in many respects. Its simplicity is admirable, and already we have changed our teaching classification to conform as closely as possible with it. The possible entities suggested by the Committee will be commented upon in order and comparisons made with our own present diagnostic and teaching units.

1. *Periosteal Fibrosarcoma.* We would be glad to accept this as an entity if we could be convinced that such an apparently purely periosteal growth presents a characteristic roentgenologic appearance. We have seen several tumors in the lower thigh which presented a definite faint shadow corresponding to a palpable mass, closely enveloping the bone, showing a thin bony line over or in part of the

[1] Codman, E. A. The nomenclature used by the Registry of Bone Sarcoma. Am. J. Roentgenol. & Rad. Therapy, February, 1925, xiii, 105–126.

mass, but no perpendicular striation, and without any evidence of bone erosion or destruction. We now suppose these cases would come under this group, but we are not sure. In one instance the patient is alive and well over five years after amputation had been performed. We have our misgivings, however, as to whether this tumor can be roentgenologically typed.

2. *Osteogenic Sarcoma.* It is very gratifying that the Committee places nearly all sarcomas originating within bone in this one comprehensive group. We would prefer the term *central osteogenic sarcoma* to distinguish these tumors descriptively from periosteal fibrosarcomas and periosteal osteogenic sarcomas if these two entities are to be accepted as such. Dr. Codman's report states that roentgenologically the osteogenic sarcomas show either a considerable amount of bone production or the more cellular types may simply destroy bone and show erosion and invasion without bone formation. To descriptively designate these two processes we have employed the terms *central non-sclerosing osteogenic* and *central sclerosing osteogenic sarcomas* as our classification. These tumors are all quite malignant, though perhaps to a variable degree, so why bother our minds with cellular names. Let the pathologist designate the cellular elements and the predominant one.

Dr. Codman states that these tumors are commonly "both medullary and subperiosteal, showing central bone destruction and subperiosteal bone proliferation." "Occasionally one appears to develop chiefly in or under the periosteum,"—but this "is a difference of proportion of medullary and periosteal involvement, rather than that these tumors are essentially either periosteal or medullary." We feel that this relieves us of the necessity for carrying any longer in our classification the entity of *subperiosteal sclerosing osteogenic sarcoma,* and we are happy to discard it.

3. *Periosteal Osteogenic Sarcoma.* This entity is still recognized by the Registry Committee. This is the growth which is almost universally called *periosteal sarcoma,* but it seems wiser to designate it as *perios eal osteogenic sarcoma* and distinguish it from the *periosteal fibrosarcoma,* provided the latter is retained as an entity. Dr. Codman seemed to suggest some doubt as to the wisdom or necessity of retaining the class of *periosteal osteogenic sarcoma,* but we firmly believe it should be retained. It possesses a universal recognition which would be very difficult of eradication. It applies to a definite appearance of faint perpendicular striation with or without a thin bony enveloping capsule giving the impression of an elevated periosteum, together with little or no evident bone erosion, at least until late. Whether it is a distinct entity or represents an early stage of an anatomically cortical sclerosing osteogenic sarcoma, the term expresses an appearance which is well known to all experienced roentgenologists. Furthermore, we believe the preservation of this term is wise from the standpoint of early differential diagnosis from syphilis, osteomyelitis (periosteal reaction) and possibly scurvy. With the picture of the entity *periosteal osteogenic sarcoma* in mind we believe one is more likely to be on the alert to distinguish it from the other conditions named.

As a fourth anatomic type of osteogenic sarcoma Dr. Codman mentions the telangiectatic tumor. It is, of course, a definite anatomic type, but we do not feel that its roentgenologic appearance is generally sufficiently characteristic to give it a place in a roentgenologic classification or recognition as an entity. Likewise we believe that the term myxoma should be dropped from roentgen-ray literature, as it represents cell type and the tumor does not present any universally characteristic appearance.

Ewing's Tumor. Any tumor which presents characteristic roentgenologic appearances which make it differ essentially in appearance from any other tumor deserves recognition as an entity. We are happy to see the Ewing tumor recognized as an entity by the Registry Committee. The roentgenologic description given to it is very clear and easily applied in attempts at interpretation. Furthermore, the fact that it responds in an almost characteristic manner to irradiation, for a time, at least, is additional reason for its recognition. As to the name, we know that Dr. Ewing does not foster the appellation by which it is usually designated. He believes it to be endothelial in origin. Then if this be true, why not bestow upon it some such name as myeloendothelioma in the same manner as we may designate the cellular and tissue origin of lymph-endothelioma or pleural endothelioma?

We hope that the Registry Committee will soon be able to rescue from the group called undifferentiated sarcoma certain other entities that can readily be acceptable in a mutual classification. Sclerosing osteogenic sarcoma arising from the pelvic bones and other flat bones like the scapula might be included in a certain group of their own. The pelvic growths unfortunately do not often afford histological proof of their identity. Some of these tumors show little or no bone destruction while others with the same or a similar appearance show a considerable amount. Many of them con-

nected with the scapula have been reported as chondrosarcomas.

In conclusion, we are appealing for a roentgenologic classification of sarcomas that will be satisfactory for roentgen diagnosis and a basis for treatment when the tumors are so diagnosed. We have nothing but praise for the work of the Registry Committee, and will do all we can to aid it. So far our only aid has been praise, but we hope to do more in the future.

The second paper was by Dr. W. F. Manges and Dr. Farrell on "Multiple Myeloma." They reviewed the literature on this subject and presented a case, with a number of illustrative films. This case was benefited by irradiation for a long period of time.

The following officers were elected for the ensuing year: Edward G. Meter, M.D., president; Albert G. Miller, M.D., vice-president; Eugene P. Pendergrass, M.D., secretary; Arthur C. Sender, M.D., treasurer.

Eugene P. Pendergrass,
Secretary.

INTER-STATE POST GRADUATE ASSEMBLY OF AMERICA

ANNUAL MEETING

The Inter-State Post Graduate Assembly of America will meet at St. Paul, Minnesota, October 12–16, 1925. The program for this meeting includes papers and addresses by many of the most prominent surgeons and clinicians of the United States. The principal officers of the Inter-State Post Graduate Assembly are William J. Mayo, president of clinics; Clifford U. Collins, president; Addison C. Page, president-elect; George V. I. Brown, speaker of the Assembly; William P. Peck, managing director, and Edwin Henes, Jr., secretary and director of exhibits.

ANNUAL MEETING AMERICAN ROENTGEN RAY SOCIETY

The arrangements for the Twenty-sixth Annual Meeting to be held at the Mayflower Hotel, Washington, D. C., Sept. 22, 23, 24, and 25, 1925, are practically completed. An unusually large attendance is anticipated. The progressive roentgenologist can ill afford to miss the scientific treat in store for him, and the many beautiful and historic sights of the National Capital should prove an attractive lure to the members of his household. In arranging the program an effort has been made to reserve ample time for recreation, and it is hoped that the entertainment features may prove attractive.

The scientific exhibit for the meeting will be under the direction of Dr. Edwin A. Merritt. Material for display and correspondence in regard to the exhibit may be addressed to Dr. Merritt at 1909 Massachusetts Ave., N. W., Washington, D. C. Interest in the scientific exhibit seems to have languished in recent years and it is hoped that it may be revived at the coming meeting. Provisions for the display of films is a matter of considerable expense to the Society and a renewal of interest will be necessary to justify its continuance. Suitable frames for the display of lantern slides as well as films will be provided. It is suggested that greater care and more detail in labeling films would add greatly to the value of the exhibit.

Drs. A. B. Crane and L. M. Christie have consented to conduct a dental diagnostic clinic in the hotel during the meeting. It is hoped that a sufficient number of "patients" may be found among those in attendance to make this innovation a success.

The president-elect has taken the liberty of naming a discussant for the various papers in which this privilege has not been exercised by the contributor. It is earnestly requested that discussants be furnished a copy of the paper in advance of the meeting.

PRELIMINARY PROGRAM

TUESDAY, SEPTEMBER 22, 1925. 9 A.M.

SYMPOSIUM ON GALL-BLADDER DISEASE

1. WHITAKER, LESTER R., Boston, Mass. "Experimental and Physiological Findings in the Study of the Gall-Bladder by Cholecystograms."
2. WARTHIN, A. S., Ann Arbor, Mich. "Pathology of Gall-Bladder Disease."
3. BELDEN, WEBSTER W., New York City. "The Secondary Evidence of Gall-Bladder Disease."
4. SOSMAN, M. C., Boston, Mass. "Cholecystography from a Clinical Standpoint."

5. STEWART, WILLIAM H., New York City. "Further Developments in the Jejunal and Oral Administration of the Tetraiodophenolphthalein Sodium Salt."

6. GRAHAM, EVARTS A., St. Louis, Mo. "The Development of Cholecystography."

Discussion of papers by DRS. WHITAKER, WARTHIN, BELDEN, SOSMAN, STEWART, and GRAHAM opened by LEWIS GREGORY COLE, New York City.

TUESDAY, SEPTEMBER 22, 1925, 2 P.M.

7. PERKINS, C. WINFIELD, New York City. "A Roentgen Study of 500 Children for Thymic Enlargement."

8. COE, F. O., Washington, D. C. "A Method for Estimating the Size of the Thymus."

Discussion of papers by DRS. PERKINS and COE by GEORGE W. GRIER, Pittsburgh, Penna.

9. GROTE, HENRY W., Bloomington, Ill. "Roentgen Findings in the Thoracic Examination of Children." Discussion: WILLIAM A. EVANS, Detroit, Mich.

10. HICKEY, P. M., and FURSTENBURG, A. C., Ann Arbor, Mich. "Demonstration of the Bronchial Tree by Iodized Oil."

11. GRADY, H. W., Washington ,D. C. "Demonstration of the Bronchial Tree by Intratracheal Injections of Lipiodol."

Discussion of papers by DRS. HICKEY and FURSENBURG, and GRADY by LEOPOLD JACKES, New York City.

EXECUTIVE SESSION

WEDNESDAY, SEPTEMBER 23, 1925, 9 A.M.

12. PANCOAST, H. K., Philadelphia, Penna. "Pneumoconiosis." Discussion: R. R. SAYERS, Chief Surgeon, U. S. Bureau of Mines, Washington, D. C.

13. GORDON, BURGRESS, Boston Mass. "The Effect of Effort on the Size of the Heart: Observations on Animals and on Marathon Runners." Discussion: L. T. LEWALD, New York City.

14. REYNOLDS, L., Detroit, Mich. "Roentgenological Study of the Pharynx." Discussion: P. M. HICKEY, Ann Arbor, Mich.

15. MOORE, A. B., Rochester, Minn. "The Roentgenological Findings in Gastro-jejunal Ulcer." Discussion: T. J. CASE, Battle Creek, Mich.

16. GRAY, A. L., Richmond, Va. "Diseased Appendix as Cause of Acidosis in Children." Discussion: WILLIS F. MANGES, Philadelphia, Penna.

WEDNESDAY, SEPTEMBER 23, 1925, 2 P.M.

17. BUTLER, P. F., Boston ,Mass. "Pyelitis in Pregnancy." Discussion: JOHN T. WILLIAMS, Boston, Mass.

18. MARTIN, CHARLES L., Dallas, Texas. "Broad Ligament Extension in Carcinoma of the Cervix." Discussion: GEORGE E. PFAHLER, Philadelphia, Pennz.

19. LIBERSON, FRANK, U. S. Public Health Service, New York City. "The Value and Safety of a Simplified Method of Pneumoencephalomyelography." "A Preliminary Report on the Use of a Special Apparatus for the Simultaneous Displacement of the Cerebrospinal Fluid by Air in Forty Cases." Discussion: CHARLES L. WATERS, Baltimore, Md.

20. KERN, M. J., St. Cloud, Minn. "Complete Roentgenological Study of the Head." Discussion: EMIL G. BECK, Chicago, Ill.

21. SKINNER, E. H., Kansas City, No. "The Roentgen Interpretation of Cerebral Abscess: Three Case Reports." Discussion: A. K. OWEN, Topeka, Kan., and LEON J. MENVILLE, New Orleans, La.

WEDNESDAY, SEPTEMBER 23, 1925, 8 P.M.

22. The CALDWELL Lecture: "Tissue Reactions to Radiation." By JAMES EWING, New York City.

THURSDAY, SEPTEMBER 24, 1925, 9 A.M.

23. LEWALD, L. T., New York City. "Pathological Fractures—Nature and Variety." Discussion: EDWARD S. BLAINE, Chicago, Ill.

24. GRANGER, FRANK B., Boston , Mass. "Roentgenographic Appearance of Calcified Bursae after the Enployment of Radiotherapeutic Measures." Discussion: ALBERTUS COTTON, Baltimore, Md.

25. BIRD, CLARENCE E., New Haven, Conn. "Osteogenic Sarcoma Arising on the Basis of Paget's Disease." Discussion: RALPH E. HERENDEEN, New York City.

26. PFAHLER, GEORGE E., Philadelphia, Penna. "A Localizing Device and Plate Changer for Mastoid Examinations." Discussion: FREDERICK M. LAW, New York City.

27. HEMLER, W. F., Washington, D. C. "Complete Insulation versus Grounding as Protection against High Tension Electric Shocks." Discussion: H. K. PANCOAST, Philadelphia, Penna.

THURSDAY, SEPTEMBER 24, 1925, 2 P.M.

28. HOOKER, D. T., Baltimore, Md. "The Effect of Roentgen Rays on the Reproductive Capacity of Male Rats." Discussion: ALBERT SOILAND, Los Angeles, Calif.

29. CASE, JAMES T., and BOLDYREFF, W. N., Battle Creek, Mich. "Effects of Radiation on Gastric Secretion." Discussion: CHARLES L. MARTIN, Dallas, Texas.

30. SAMUEL, E. C., New Orleans, La. "Roentgen-ray Treatment in Exudative Iritus." Discussion: HOWARD P. DOUB, Detroit, Mich.

31. HAZEN, H. H., Washington, D. C. "Treatment of the Bowen Type of Skin Cancer." Discussion: DOUGLAS QUICK, New York City.

EXECUTIVE SESSION

THURSDAY, SEPTEMBER 24, 1925, 7:30 P.M.

ANNUAL BANQUET

FRIDAY, SEPTEMBER 25, 1925, 9 A.M.

32. PFAHLER, GEORGE E., and WIDMAN, B. J., Philadelphia, Penna. "Analysis of Cases and Technique in the Radiation Treatment of Carcinoma of the Breast." Discussion: BURTON J. LEE, New York City and HENRY SCHMITZ, Chicago, Ill.

33. QUICK, DOUGLAS, and CUTLER, MAX, New York City. "Effects of Radiation on Squamous Cell Carcinoma Metastasis in Cervical Lymph Nodes." Discussion: JAMES EWING, New York City.

34. MORGAN, J. D., Philadelphia, Penna. "More about Fractional X-radiation with Demonstration of Cases." Discussion: Robert E. Fricke, Baltimore, Md.

35. LAFFERTY, ROBERT H., and PHILLIPS, C. C., Charlotte, N. C. "Preliminary Report of the Use of Corpus Luteum Extract to Prevent Nausea in Radiation Therapy of Uterine Conditions." Discussion: EDWIN C. ERNST, St. Louis, Mo.

FRIDAY, SEPTEMBER 25, 1925, 2 P.M.

ENTERTAINMENT

MEETINGS OF ROENTGEN SOCIETIES

We contemplate the publication of a list of roentgen society meetings such as that below, in each issue of the Journal, grad-

ually adding other home and foreign societies as the information reaches us. Secretaries of societies not here listed are requested to send the necessary information to the editor.

NEW YORK ROENTGEN SOCIETY
Secretary, Dr. Eugene V. Powell, 217 East 42d St.
Meets monthly on second Monday, New York Academy of Medicine.

THE CANADIAN RADIOLOGICAL SOCIETY
Secretary, Dr. E. C. Brooks, Montreal.
Annual meeting, Regina, Sask., June 22–26, 1925.

ROENTGEN RAY SOCIETY OF CENTRAL PENNSYLVANIA
Secretary, Dr. W. E. Reiley, Clearfield, Penna.
Two meetings a year, April and October.

THE NEW ENGLAND ROENTGEN RAY SOCIETY
Secretary, Dr. Frank E. Wheatley, 520 Beacon St., Boston, Mass.
Meets monthly on third Friday, Boston Medical Library.

PHILADELPHIA ROENTGEN RAY SOCIETY
Secretary, Dr. Eugene Pendergrass, University of Pennsylvania, Philadelphia.
Meets monthly on first Thursday evening, Pennsylvania Hospital

CHICAGO ROENTGEN SOCIETY
Secretary, Dr. Edward S. Blaine, 2005 S. Wabash Ave.
Meets monthly on second Friday from October to May (except during month of December) at Virginia Hotel. Dinner at 6 P.M., scientific session at 8 P.M.

PACIFIC COAST ROENTGEN RAY SOCIETY
Secretary, Dr. R. G. Van Nuys, San Francisco.
Two meetings a year.
Coming meeting at Hotel Oakland, Oakland, Calif., July 9, 10 and 11, 1925.

CLEVELAND RADIOLOGICAL SOCIETY
Secretary, Dr. E. P. McNamee.
Meetings are held at 6 o'clock at the University Club, on the fourth Monday evening of each month from September to April, inclusive.

CENTRAL ILLINOIS RADIOLOGICAL SOCIETY
Secretary, Dr. C. J. McCullough, Decatur, Illinois.
Regular meetings held quarterly.

SOCIETA ITALIANA RADIOLOGIA MEDICA
Secretary, Professor M. Ponzio, University of Torino, Torino.

THE BRITISH RÖNTGEN SOCIETY
Meets on the first Tuesday of each month from November to June inclusive, at 8.15 P.M., at the British Institute of Radiology, 32 Welbeck St., London, W. 1.

ELECTRO-THERAPEUTIC SECTION OF THE ROYAL SOCIETY OF MEDICINE (CONFINED TO MEDICAL MEMBERS)
Meets on the third Friday of each month during the winter at 8.30 P.M. at the Royal Society of Medcine, 1 Wimpole St., London, W. 1.

BRITISH INSTITUTE OF RADIOLOGY
Secretary, Dr. John Muir, 32 Welbeck St., London, W. 1.
Meets at 32 Welbeck St., but regular dates and times of meeting have not yet been arranged.

SCANDINAVIAN ROENTGEN SOCIETIES
The Scandinavian roentgen societies have formed a joint association called the Northern Association for Medical Radiology, meeting every second year in the different countries belonging to the Association. Each of the following societies meets every second month except in the summertime:

Society of Medical Radiology of Sweden
Meets in Stockholm.
Society of Medical Radiology in Norway
Meets in Oslo.
Society of Medical Radiology in Denmark
Meets in Copenhagan.
Society of Medical Radiology in Finland
Meets in Helsingfors.

DUTCH SOCIETY OF ELECTROLOGY AND ROENTGENOLOGY
Meets in Amsterdam every second month except in the summertime.

DEPARTMENT OF TECHNIQUE

Department Editor: DAVID R. BOWEN, M.D., Pennsylvania Hospital, Philadelphia, Pa.

In this department will be published from time to time, as material is available, suggestions for improvement in technique.

MODIFIED GRANGER METHOD OF ROENTGENOGRAPHING SPHENOIDS

BY LLOYD BRYAN, M.D.

SAN FRANCISCO, CALIFORNIA

THE accompanying illustrations show a modified Granger sinus board for a simple method of roentgenographing sphenoids.

The front of the board is made of bakelite and the back part of the box can be made of ordinary wood. The patient sits upright in a comfortable position with the nose in the aperture in the lower half of the box. Firm contact is made with the chin and prominences of the cheeks against the board. The tube is adjusted at about 30 inches from the film and the rays projected at right angles to the film and through a line drawn through the tip of the mastoid and the supraorbital ridge. The time of exposure is 12 sec., with 40 ma-min. in the tube and 4-in. spark gap, using the Eastman duplitized super-speed films. The angle will have to be varied slightly depending upon the shape of the skull, but a trial exposure using the method described will give a correct angulation. The shadow of the sphenoid is thrown into the shadow of the foramen magnum.

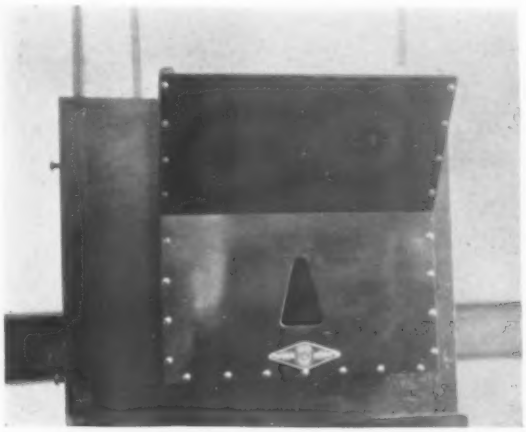

FIG. 1.

FIG. 2.

This projection along with the ordinary anteroposterior projection and a lateral view will be found to be of great help in diagnosing sphenoidal disease.

BOOK REVIEWS

Books Received Are Acknowledged under Heading: Books Received. This must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

THE LIFE OF SIR WILLIAM OSLER. By Harvey Cushing. Volumes i and ii. Cloth. Price, $12.50. Pp. 1442. Oxford, at the Clarendon Press: 1925.

This latest addition to the biographies of great men in medicine has been received with such enthusiasm and with what seemed such exaggerated praise that we began its perusal in a somewhat defensive frame of mind. In spite of the fact, however, that the work consists of two volumes of over 700 pages each we have read it through without skipping even a footnote and we find ourselves now among the enthusiasts. With due allowance for the mental stimulation brought about by our recent contact with one of the most dynamic characters that the medical world has ever known, we think it not too much to say that here is a work that will rank among the great medical biographies of all time.

We have some idea of the labor necessitated in the collection and arrangement of the almost innumerable letters and notes from Osler to friends, relatives and professional associates and other innumerable communications to Osler from all sorts of people. The author has almost completely effaced himself in this biography but it is not merely a collection of letters and abstracts arranged in chronological order. Such a collection might not be interesting, would, in fact become very tiresome; but the author has fitted them so deftly into the narrative of the events of Osler's life and the larger happenings of the medical world and has shown such fine discrimination in the parts selected for quotation that the reader's interest never flags for a moment. He has left a vivid picture not only of the tireless scientific worker, the keen clinician, the wise physician and one of the greatest teachers of medicine of all time, but a picture of a man of the finest sensibilities, with a sense of humor that was droll and whimsical, of a man whose whole life literally flowed out in service to mankind,—a broadminded, tolerant, sympathetic man. "Charity for all" seemed to be his motto. The only one he did not spare was himself. He said in an address to students in 1899, "The best way is to keep a looking-glass in your own heart, and the more carefully you scan your own frailties the more tender you are for those of your fellow creatures."

Dr. Cushing has drawn so clear and life-like a picture that even those of us who never had the privilege of meeting the great teacher feel that we have not only met the real Osler but that we have met him many times. We have a clear picture of him as the young student and the still young professor at McGill—his boundless enthusiasm and energy that reached out into the fields of biology, physiology, pathology, veterinary medicine and finally clinical medicine, and that even enabled him to read and make his own all sorts of fine literature not related to medicine. We recall his frequent visits to European teaching centers at a time when there was almost no real medical teaching in America, and his interesting reports of clinics and medical meetings and impressions of the great teachers of the time. We can see him transplanted from his Canadian environment to the United States. We marvel at the ease of his transition from pathologist to the position of an active teacher of clinical medicine, but we soon realize that the latter field is his natural habitat.

It is noteworthy that Osler, the greatest teacher of medicine of his own, or perhaps any other day, spent his early years in the study and teaching of pathology. This was true also, as Cushing remarks, of Virchow, whom Osler greatly admired. He could have become a great pathologist or experimental investigator but he became instead the great clinician.

We can read only a little way, however, until we realize that William Osler's interests covered the entire field of medicine. In 1888, while in Philadelphia, he wrote important articles on the cerebral palsies of children, based on analysis of 151 cases. He made extensive investigation of the rôle of phagocytosis in infections, and in 1889 before the Alumni Association of Bellevue Hospital he gave a detailed presentation of the theory and work of Metchnikoff.

One of his most important contributions was his description of the pathology and symptomatology of the "ball-valve gall-stone in the common duct." Cushing says it was "so important both to physician and surgeon . . . it deserves to be known as Osler's syndrome."

Those who have ever made any study of tropical medicine and have spent hours over

the microscope searching slides for the malarial parasite must be interested in Osler's profound and extensive study of that disease. He was the first teacher and writer in this country to grasp the value of blood studies in malaria. In spite of the fact that Laveran had discovered the malarial parasite and Sternberg and others had agreed upon its causal relation to the disease, it was the writings of Osler that stimulated interest in the disease and "popularized throughout the profession the knowledge necessary for its proper recognition." Continuously interested in diseases due to animal parasites, beginning in his youth when he discovered and reported at length upon trichinae in man, he later wrote papers on cestode and echinococcal infections and in 1890 reported a case of filaria sanguinis hominis. His notebooks contain descriptions of the ameba of dysentery which he first saw in pus from a liver abscess. This was written up in the Johns Hopkins Bulletin and was the "first confirmation in English speaking countries of Kartulis' reports of amoebae in dysentery."

Throughout his life Osler maintained a constant and active interest in public health. There was no one more active in the crusade against tuberculosis, and Professor Welch writes that he was "perhaps the first to work out the home treatment" of this disease. Although he pointed out "typhoid spine" and insisted upon the abandonment of the term typhoid-malaria, his main contribution to the typhoid problem was in public sanitation.

To those of us who are accustomed to think of Osler as the clinical investigator and the practical teacher who first brought students in direct contact with patients in the hospital wards, his constant interest in books and libraries seems very remarkable. From his earliest days as a student to the very end of his life he maintained an eager interest in medical history and medical libraries. A quotation from an address given in Boston in 1901 is familiar to all—"to study the phenomena of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all." His perennial interest and unflagging energy are indicated by the following quotation from Volume II, page 69: "To whatever soil he was transplanted the same Osler grew and flourished, modifying his environment more than it modified him. It is interesting to see how consistently he began anew in Oxford with precisely the same projects as those which had engaged him in Montreal, Philadelphia and Baltimore. A consuming interest in libraries and librarians; the revivifying of an old medical society or the organization of new ones; the establishment of a medical journal, the bringing together of discordant elements in the profession, and the raising of money when money was needed."

Like his great teacher, Virchow, Osler was honored for his achievements but also like him he was loved for his tolerance, his charity, his nobility of character and cleanness of life, and for his sympathetic understanding of people, especially the young and the very old. A glimpse of his own philosophy of life may be had from the following quotations. The first is from his valedictory address at the University of Pennsylvania, the second from an address entitled "Chauvinism in Medicine" delivered before the Canadian Medical Association in 1902. In the first he said that Antoninus Pius summed up his philosophy of life in the word *aequanimitas*, "so for you, fresh from Clotho's spindle, a calm equanimity is the desirable attitude. How difficult to attain, yet how necessary in success as in failure." The second quotation, Cushing says "would almost stand as a fit biography of William Osler, could one read sufficiently widely and far between the lines." It is as follows:

"I began by speaking of the art of detachment as that rare and precious quality demanded of one who wished to take a philosophic view of the profession as a whole. In another way and in another sense this art may be still more precious. There is possible to each one of us a higher type of intellectual detachment, a sort of separation from the vegetative life of the work-a-day world—always too much with us—which may enable a man to gain a true knowledge of himself and of his relations to his fellows. Once attained, self deception is impossible, and he may see himself even as he is seen—not always as he would like to be seen—and his own deeds and the deeds of others stand out in their true light. In such an atmosphere pity for himself is so commingled with sympathy and love for others that there is no place left for criticism or for a harsh judgement of his brother. 'But these are Thoughts of things which Thoughts but tenderly touch,' as that most liberal of men and most distinguished of general practitioners, Sir Thomas Browne, so beautifully remarks; and it may be sufficient to remind this audience, made up of practical men, *that the word of action is stronger than the word of speech*."

Just as Osler's life was a stimulus to everyone with whom he came in contact so Cushing's "Life," teeming with intimate contacts with the man through his letters, addresses and innumerable incidents of a crowded life, will be a stimulus to every reader. A. C. C.

ERGEBNISSE DER MEDIZINISCHEN STRAHLENFORSCHUNG (RÖNTGENDIAGNOSTIK RÖNTGEN-, RADIUM-UND LICHTTHERAPIE). By H. Holfelder, Frankfurt a. M., H. Holthusen, Hamburg, O. Jüngling, Tübingen, and H. Martius, Bonn a. Rh. Volume I. Price, $11.70. Pp. 748, with 451 illustrations in the text, and with 3 photographic plates. Leipzig: Georg Thieme, 1925.

This very excellent work is not an ordinary textbook, but consists of separate chapters upon special subjects in which there is a complete review by eminent authorities of the advanced knowledge from the radiological standpoint, with a bibliography at the end of each chapter.

The first chapter (87 pages) deals with the "Problems and Results in the Roentgenological Diagnosis of Neoplastic and Inflammatory Tumors of the Colon," by Fischer, Frankfurt a. M., in which are described the various techniques used, their indication, and the pathology that may be found. Of special interest is the combination of the opaque enema and the insufflation of air. Under these conditions, by rotating the patient and obtaining different levels of fluid, the pathological deformities and adhesions may be nicely shown.

Section II—"Concerning Bone Atrophy," by Friedl and Schinz, Zürich, consists of a review of the pathology, etiology and roentgenographic appearances.

"Acute Miliary Tuberculosis in the Roentgenogram," by Lorey, Hamburg, is of special interest and is illustrated by three photographic plates showing the fine details of lesions in 11 cases, compared with one normal.

"Spectroscopy in Medical Roentgenology" is written by Grebe, Bonn. This chapter is 35 pages in length, with 22 illustrations and several tables. Grebe concludes, however, that even the so-called homogeneous radiation is still made up of a wide variation, but that by this method exact values may be determined. The ionization measurements have been described by Küstner, Göttingen, using 190 pages, 130 illustrations and 58 tables. As might be expected, from the above facts, the subject is completely reviewed.

Glocker, Stuttgart, discusses the subject of protection against radiation and arrangements of roentgen departments.

Holthusen, Hamburg, describes the various methods used to increase the radiosensibility of the tissues, but concludes that little has been accomplished.

The roentgenized testicle has been described in great detail by Schinz and Slotopolsky, Zürich, in which they describe and discuss the experimental work that has been done.

Lahm, Dresden, has devoted 130 pages to the use of the roentgen and radium rays in carcinoma. This chapter alone is a book on therapy.

Kurtzahn, Königsberg, has written the chapter on radiotherapy of carcinoma of the esophagus. His results are much like those obtained in America, giving a prolongation of life of an average of six months, but no cures.

As a whole, this excellent work should be in every complete library on radiation, and will be of special interest to the scientific student and practical worker who aims at thoroughness.

G. E. Pfahler.

BOOKS RECEIVED

AN X-RAY ATLAS OF THE NORMAL AND ABNORMAL STRUCTURES OF THE BODY. By Archibald M'Kendrick, F.R.C.S. (Edin.), D.P.H., F.R.S.E., Surgeon-in-charge of the Surgical X-ray Department, Royal Infirmary, Edinburgh Examiner, Royal College of Surgeons, Edinburgh, and Charles R. Whittaker, F.R.C.S. (Edin.), F.R.S.E., Assistant Lecturer on Anatomy, Surgeons' Hall, Edinburgh Examiner, Royal College of Surgeons, Edinburgh. Cloth. Price, $10.00. Pp. 222, with 388 illustrations. New York: William Wood and Company; Edinburgh: E. & S. Livingstone, 1925.

LANDMARKS AND SURFACE MARKINGS OF THE HUMAN BODY. By L. Bathe Rawling, M.B., B.C. (Cant.), F.R.C.S., Surgeon to St. Batholomew's Hospital. Sixth edition. Cloth. Price, $3.00. Pp. 97, with 36 illustrations. New York: Paul B. Hoeber, Inc., 1925.

TEETH AND JAWS ROENTGENOLOGICALLY CONSIDERED. (Annals of Roentgenology. Volume Five.) By Herman A. Osgood, M.D., Roentgenologist to the Trumbull Hospital; Consultant Roentgenologist, Gale Memorial Hospital, Haverhill, Mass. Cloth. Price, $10.00. Pp. 99, with 407 illustrations. New York: Paul B. Hoeber, Inc., 1925.

INTERNATIONAL ABSTRACTS OF ROENTGEN AND RADIUM LITERATURE

ROENTGEN DIAGNOSIS

BIERMAN, MORRIS I. Idiopathic eventration of the diaphragm. *Radiology*, February, 1925, iv, 122–124.

One of the abnormalities of development is eventration of the diaphragm, and the condition may be described as an idiopathic lesion in which one-half of the diaphragm becomes greatly relaxed so that the abdominal organs encroach upon the thoracic cavity. The diaphragm is thin and fibrotic, but there is no degeneration of the corresponding phrenic nerve. The clinical recognition of eventration of the diaphragm is almost impossible without the aid of the roentgen ray.

A case is described occurring in a male, aged thirty-three. Roentgenographic examination showed that the left leaf of the diaphragm had relaxed so that its upper border was on a level with the fourth rib anteriorly. The heart was displaced to the right. The left diaphragm at first appeared immobile, but on forced respiration there was an excursion of less than ½ inch, descending with inspiration and rising with expiration, the normal movements. The right diaphragm moved freely and well, and by contrast appeared even to compensate for the diminished excursion on the left side. The cardiac action was normal.

A barium meal was given and another examination made in order to rule out a possible hernia with protrusion of the upper gastric pole through a defect in the diaphragm. The entire stomach was seen to be below the diaphragm and the diaphragmatic attachments were unusually clear.

LEFEVRE, W. I. Recent roentgenographic findings in cases of severe gun-shot wounds received during the world war. *Radiology*, February, 1925, iv, 118–121.

In an examination of 20,000 war veterans, 2600 were roentgenographed. Of the latter approximately 350 had gun-shot wounds. The penetrating wound is of most interest roentgenographically as a retained missile can be observed. In contused wounds or perforating wounds, only when the bony structure has been involved are they discernible. It has been stated that penetrating wounds formed a large percentage of those sustained in the late war. A series of 10 cases are briefly cited in individuals who had survived the injury from three to about five years.

MILLS, H. P., AND WATKINS, W. W. The *x*-ray shadows of secondary infection in lung tuberculosis. *Radiology*, March, 1925, iv, 178–180.

Tuberculosis invades lung tissue through the lymph channels, therefore the infection first surrounds the lobules because the lymphatic vessels inclose each anatomical lung unit very much like a fish net holds its contents. The smallest visible tuberculous lesion therefore is the dim outline of a secondary lobule with its congested lymphatics and beginning granulomatous consolidation. The lesion has a definite relation to the bronchial tree and this relation can be traced by the striation densities which mark the blood vessels accompanying the bronchi. In instantaneous films with the very finest detail, the delicate fish-net shadows surrounding the involved lobule (containing an area of increased radiopacity) can be made out. On the usual film, there is only a haziness more or less sharply delimited from the surrounding tissue.

It is a fairly safe rule that tuberculosis does not invade the basal regions until late, so that a tuberculous density is, for all practical purposes, an upper lobe shadow. Another fairly safe guide in differentiating lung shadows is their structural peculiarity. Pyogenic infections when developed to the stage of visibility are relatively more radiopaque than are tuberculous shadows. It is seldom that isolated tuberculous consolidations are found without adjoining lesions presenting typical characteristics of early tuberculosis. Tuberculous consolidations when uncomplicated usually spread by continuity and coalesce, while those of other infections are more likely to be discrete even when quite numerous. Miliary tuberculosis is an exception.

Attenuation of the hilus densities, or discrete densities in the hilus region, or discrete or irregular densities in the base of the lung should be interpreted as probably non-tuberculous. Many of the densities attributed to non-tuberculous infection resolve and disappear in time. It is believed that a tuberculous area or any other granuloma will not entirely heal by resolution, but there will always be some degree of fibrosis visible roentgenographically.

SCHWANKE, W. Ankylosis of the spine. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 1–25.

Ankylosis of the spine has been found 14 times in 1400 patients observed by the author

during the past three years. It is believed that a frequency of 0.2 to 0.4 per cent describes the ordinary incidence. A total of 30 cases has been observed during the past seven years, and these cases are cited and illustrated.

In certain cases the roentgenogram demonstrates very clearly an increased ossification along lines of greatest strain and it is upon this evidence that the author concludes such cases represent a true metaplasia rather than a calcification following inflammation, etc. The stiffened spine may be considered as a rod capable of bending, and from theories of statical mechanics, the sections of greatest strain and weakness can be determined. These were analyzed and found to conform to the clinical finding.

POLGÁR, FRANK. Latent rupture of a hypostatic abscess into the bronchi. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 31–36.

Abscesses occurring in disease of the thoracic vertebrae are, in most cases, first discovered in roentgen examination. The case described is of interest as one of tuberculous spondylitis of the thoracic vertebrae having an abscess communicating both with the surface of the body and with the bronchial system. The roentgen examination showed the bodies of the third to the fifth thoracic vertebrae diminished in size, markedly tuberculous and showing gibbus formation. The ventro-dorsal picture showed an intense shadow symmetrical with the backbone starting at the level of the tenth vertebra and gradually broadening out upward to above the clavicles. A fistular opening in the neck was shown by means of the contrast filling to connect with the abscess. The contrast material dropped down into the abscess cavity apparently somewhere near the bifurcation of the bronchus into the left bronchus. This case occurred in a boy fourteen years old.

SILFVERSKIÖLD, NILS. A "forme fruste" of chondrodystrophia with changes simulating several of the known "local malacias." *Acta radiol.*, March 20, 1925, iv, 44–57.

The description is given of a peculiar case of chondrodystrophia in which the forearms and hands are in all essentials normally developed. This case presents to a greater extent than any other hitherto published, roentgenographic changes recalling in many respects the roentgenographic findings in Legg-Calvé-Perthes-Waldenström's disease of the hip, Köhler's disease of the scaphoid, and the other so-called "local malacias."

Roentgenographically there were observed certain osseous changes especially pronounced in the lower extremities. There were skeletal anomalies such as epiphyseal formations in foot and hand which are not present normally, as well as free extra-osseous nuclei in carpus, tarsus and other locations. Stunted growth is betokened especially by the osseous nuclei in tarsus and carpus, though this stuntedness varies in the different bones. Reduced weight-bearing ability is indicated by the changes in the hip joints (upward enlargement of the acetabular cavities, compression of the head, neck and metaphyses of the femur), the slightly S-shaped femur, genua valga, the flattening of several bones of the foot, especially those subjected to the greatest pressure: astragalus, scaphoid, cuneiform, the epiphyseal parts of the first metatarsophalangeal joint. In the shoulder joint also the epiphysis is flattened and slightly reduced in the capitulum humeri.

JOSEPH, BARNET. Relation between clinical findings, roentgen examination and surgical exploration in carcinoma of the stomach. *Arch. Clin. Cancer Research, N. Y.*, January, 1925, i, 41–58.

When a patient has reached the cancer age and suddenly begins to suffer from gastric distress, anorexia, loss of strength and weight which is progressive, and does not yield to ordinary medical treatment, he must be regarded as a potential case of gastric cancer and should be subjected to a complete clinical and roentgen examination. If the roentgen examination is negative the patient is re-examined at stated intervals, and if the symptoms are not relieved another complete analysis should be made. If the roentgen examination, together with the clinical investigation indicates some pathologic condition in and around the stomach such a case demands a prompt surgical exploration. Such an exploratory laparotomy is fairly harmless as compared with the possibility of overlooking a gastric cancer in its early operable stage. A negative roentgen-ray finding does not preclude the presence of a gastric cancer. The latter may be located on the posterior wall of the stomach or anywhere within the gastric wall provided it is small in size and has not invaded the musculature. This point must be kept in mind.

Three cases are described. In the first there was a filling defect caused by a pancreatic tumor. This defect was ragged whereas under similar conditions it is usually smooth in the roentgen picture. A subsequent laparotomy disclosed a tumor of the pancreas while the stomach was entirely free of any tumor. In the other two cases the filling defect of the

gastric wall was caused by metastatic ovarian carcinoma invading the wall of the stomach. In both instances the invasive growth penetrated the muscularis and grew irregularly into the lumen of the stomach, pushing up the gastric mucosa. The irregularity of the filling defect is identical roentgenographically with that produced by an intragastric tumor which destroys the mucous membrane and then invades the muscularis. In these two cases the roentgen diagnosis was gastric cancer, while the clinical analysis was indefinite.

When a non-removable malignant tumor is found in and around the stomach an intratumoral insertion of radium emanation may be done for purposes of palliation without increasing the operative risk. One such case is described.

BERNSTEIN, MAURICE. Osteochondritis dissecans. *J. Bone & Joint Surg.*, April, 1925, vi, 319–329.

The theory of extra-articular loose bodies pushing into the joint scarcely agrees with the definition of loose bodies arising within the joint itself. It would appear that there must be some underlying constitutional factor, probably a congenital predisposition of the joint tissues, which is indispensable in the formation of loose bodies in joints. This would account for the occurrence of loose bodies in homologous joints in the same patient, and also in the occurrence of cases in several members of a family. Granting the existence of such a hereditary predisposition, any exciting cause such as traumatism or inflammatory change would act as an exciting cause for the formation of loose bodies in such a joint. The similar embryonic origin of the articular cartilage and synovial membrane, with the possibility of cells from the latter returning to the state of cartilage, and the view held by some that loose bodies can arise from embryonic "rests" are only particular cases of predisposed joints.

A description is given of cases of osteochondritis dissecans occurring in a man and his two sisters. It is probable that such a familial predisposition of the knee joint occurs rather frequently. Cases of loose bodies have been known to remain for long period without producing obvious symptoms and unless they cause much pain or disability they are apt to be overlooked. Many such cases have been discovered only accidentally. In the 3 cases described the condition occurred bilaterally in the knee joints. The anteroposterior and lateral view of the joints showed numerous loose bodies, a number of them being deposited in the posterior compartment of the knee joint, some in the suprapatellar space and in the articulation. The defect in the femoral condyle is quite characteristic of osteochondritis dissecans, showing no break in the continuity of the periphery, but a distinct rarefaction as if the defect was filled in by bony tissue. The anteroposterior view showed marked denudation of the mesial condyle with a tendency to bone regeneration as indicated by the dense bony outgrowth at the intercondylar space. The joint was markedly decreased and there was evidence of impingement of the tibial spine upon the intercondylar notch.

Typical roentgenograms of this condition are presented.

BITTORF, A., and HÜBNER, I. The roentgen picture of the esophagus in kyphoscoliosis. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 59–68.

Studies upon the position of the esophagus in pathologic curvatures of the spine were made by the aid of observations, both in the dorsoventral and first oblique views, during the passage of contrast material. Unlike the aorta which is more or less closely fixed to the spine by the various costal arteries, the esophagus usually follows the shortest line to the opening in the diaphragm. It is only in very advanced cases or in tuberculosis that the esophagus is observed to follow a wavy course somewhat parallel to the curved spine. From the roentgenological viewpoint the alterations in the course of the esophagus in kyphoscoliosis may be differentiated into three general types. The first type comprises those uncomplicated cases of mild or medium degree of advancement occurring most usually in school children. The second type comprises the uncomplicated cases of advanced to very severe degree; while the third type includes those cases complicated by tuberculosis of the spine or congestion abscesses.

The esophagus in the first group, when viewed dorsoventrally, usually has an almost vertical direction from the neck to the diaphragm with only slight deviations. When viewed in the first oblique position certain peculiarities may become apparent. In certain cases the esophagus runs practically straight up and down. However more usually there is a concavity following that of the spine. This concavity is usually of very slight degree, rarely more pronounced. It has, however, never been observed to be very acute in this type of the condition. This concavity of the esophagus is apparently always caused by the heart, whose shadow is observed to lie directly against that of the esophagus; an open space between these two structures never being observed. Whenever the heart shadow is

enlarged, which is not unusual even in mild kyphoscoliosis, the esophagus as a rule makes a distinct bend about the heart. Only in rare cases has there been observed a slight curvature of the esophagus in the presence of a pronounced enlargement of the heart shadow.

In a case of medium kyphoscoliosis there was observed a slight widening of the lower section of the esophagus shadow which passed through the diaphragm without constriction. Such a finding is unusual and when it does occur it is of slight extent. It is, however, usually found in the most advanced stages of kyphoscoliosis when the broadening may be relatively very great.

In uncomplicated kyphoscolioses of more advanced stages such as are found in persons of twenty years and older, the twists of the esophagus are very much more pronounced. In some such cases the esophagus viewed dorsoventrally may still maintain a vertical course. This is probably due to a compensating effect of an enlarged heart in such cases. In the oblique view the picture is more variable. Most usually there is a more or less pronounced curvature following that of the spine, and in cases where the latter is very much twisted the esophagus may present an s-shaped form. In most of the cases the curvature of the esophagus is maintained by the enlargement of the heart, but there is evidence to indicate that the curvature in part may be due to adhesions between the esophagus and the spine. Moreover the shape of the esophagus is not as regular as in the first type described. Although in general the shape is practically normal, that is cylindrical, yet not infrequently it is narrowed where the heart presses against it. In one case such a condition produced a temporary stenosis.

The roentgenographic picture found in a woman twenty-eight years old is given as follows: In the first oblique diameter the shadow of the esophagus passes from the throat to the diaphragm with but slight deviation from the course of the spine. It runs close to the heart shadow and separates from that of the spine considerably in its middle section and rejoins it farther down. The greatest bending of the spine occurs in the middle section of the thoracic vertebrae. At this level the esophagus appears to have become *invaginated*. At this point it became suddenly very narrow, the lower section appearing to run into the upper. This lower segment continued irregularly down to a junction with the spine and then appeared again to assume its normal diameter. Whether this was a case of actual invagination could not be determined from further examinations.

The picture of the esophagus in cases complicated by tuberculosis of the spine is characterized by the fact that the spinal curvature occurs comparatively rapidly and the esophagus has not had an opportunity to adjust itself to the changed conditions. As a consequence instead of a tube running almost vertically from the throat to the diaphragm there is found a very wavy form. Moreover, adhesions to the spine may fix the esophagus in unusual positions.

BÖHME, A. Pneumonoconiosis of miners in the Ruhr area. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 38–50.

Investigations of the relation of tuberculosis to pneumonoconiosis show that the occurrence of roentgenologically demonstrable indurative anthracosis with tuberculosis is rare. This corresponds to the general experience of a low incidence of tuberculosis among the miners of the Ruhr section. The nonspecific inflammation induced by coal dust inhalation apparently induces a certain resistance to the attacks of tubercle bacilli. A possible direct anti-infectious influence of the inhaled coal particles is not excluded.

On the other hand, stone cutters in the same section of the country have a high tuberculosis incidence.

A series of 12 cases is described. Exposure of ten to thirty-two years by miners to coal dust results in a pneumonoconiosis which is clearly recognizable roentgenologically but which apparently leads to no definite clinical disturbance. The localization of denser anthracotic areas immediately below the clavicles is not unusual.

DAY, ROBERT V., FAIRCHILD, F. D., AND MARTIN, H. W. A plan for the early diagnosis and management of primary papilloma of the ureter and kidney pelvis. *Surg., Gynec. & Obst.*, April, 1925, xl, 485–492.

When a patient has hematuria or any other symptom likely to be of renal origin, his physician should not be content until he discovers the primary source of the bleeding and the pathological nature and extent of the lesion behind it by an adequate urological examination. Thorough urological examination may not result in an absolutely accurate pathological diagnosis but it indicates to the surgeon what to do and what to expect. Primary nephroureterectomy offers the patient the maximum chance of complete cure, and a two-stage nephrectomy and ureterectomy should be necessary only in a few cases. In the removal of a neoplastic kidney or if there is suspicion of

any kind of tumor, splitting and examination of the kidney should be made before closure.

Primary tumors of the kidney pelvis and especially of the ureter are very rare. In a few cases stone seems to have been a factor in the causation of papillomata in both the ureter and kidney pelvis. Leukoplakia of long standing, irritation and inflammation are at times probable factors. Some patients have been workers in dye and chemical factories. The literature shows that even the histologically benign types of papilloma have almost invariably developed local malignancy, and metastasis followed operation unless the surgery had been most thorough. The first case reported is that of a malignant papilloma of the right ureter with hydronephrosis. The roentgen ray disclosed an irregular shadow 3 by 2.5 by 2 cm. in the region of the right kidney. The mass in the right side consisting of a large hydronephrotic sac containing a small calculus and a partially calcified caseous mass in the lower pole was removed with about 5 cm. of the ureter. The second case was that of a papilloma of the kidney pelvis, the pyelogram showing filling defect before occurrence of late secondary changes. A nephrectomy was done but the kidney was not split and inspected until after closure. Microscopic examination showed a malignant papilloma of the kidney with secondary chronic nephritis. The patient was therefore given a total of 800 ma-min. of high voltage (220 kv.) roentgen-ray therapy divided into 40-minute treatments, 5 ma., 50 cm. distance, 24 cm. port, 0.75 mm. Cu plus 1 mm. Al, two treatments each front and back. The patient has remained in good health for eleven months after operation.

DESJARDINS, A. U. Pleuropneumonitis following *x*-ray treatment, and diffuse metastasis to the lungs from cancer of the breast. *Radiology*, April, 1925, iv, 265–272.

Definite inflammatory phenomena follow in a small percentage of cases in which the thorax is subjected to roentgen-ray treatment. This is found not only in cases of cancer of the breast but also in a few cases of other conditions. The total number, however, is very small. This reaction of the lungs has been termed a fibrosis but unless permanent scar tissue remains in the affected lung this term is misleading. It is more appropriate to call this phenomenon roentgen-ray pleuritis or pleuropneumonitis.

During the early phases the roentgenologic signs consist of a diffuse fog of inflammatory pleural thickening; or there may be a picture of the focal type of pneumonia so commonly seen after influenza. This may begin near the hilus or the area of infiltration may be located well within the lung fields. The process may extend quickly and then progressively clear up, or it may be more gradual, continue for a longer period and be more likely to leave permanent marks. The zone of infiltration is generally irregular in outline and density. If the infiltration is central and interferes with the free passage of air toward the periphery the corresponding lobe or lobes may collapse more or less. Gradually the infiltration shadow becomes less dense and at a certain stage there becomes evident a more or less distinct pleural thickening and adhesion of the parietes or the diaphragm on the affected side. The infiltration may disappear entirely if the irritation has been slight. In other cases there is a degree of permanent alteration in the density of the lung tissue consisting of irregularly arranged strands of varying density, producing a distinct change in the architecture of the lung field, and disturbance of the normal markings. Sometimes the infiltrative shadow is so mottled as to simulate certain forms of lung metastasis. The patient should be kept under periodic observation before one can feel reasonably certain of the true condition.

These pulmonary reactions are more likely to occur as the roentgen-ray dosage reaches or passes beyond the point of skin tolerance; i. e., if the dose is such as to produce a strong skin reaction the pleura and lungs are also very likely to be irritated. Such reaction never occurs after the first course of roentgen-ray treatment and seldom after the second, but if further treatment is given with full dosage the pulmonary manifestations are likely to appear.

In pulmonary metastases the roentgenographic picture of the focal type of the condition is characteristic, but the diffuse type can very easily be confounded clinically as well as roentgenologically with the pleuropulmonary reaction to radiation. In a large majority of the latter cases the roentgenogram shows heavy line-like streaks along the bronchi reaching from the hilum out into the parenchyma. It is usually bilateral and generally more pronounced on the side corresponding to the primary tumor. One may also see well-defined mottling, which in more marked cases gives almost the appearance of miliary tuberculosis. The line-like streaks often have a distinct beaded, finely segmented appearance; sometimes the streaks are less evident, the fine beading or speckling being irregularly distributed about the field.

The differential diagnosis between pleuropulmonary roentgen-ray reaction and diffuse pulmonary metastasis requires careful observation. Generally the radiation reaction is unilateral, while the metastasis is bilateral.

In the former there is a tendency to retraction of the injured lung and of the mediastinum toward the affected side, and the symptoms tend to subside. In extremely rare cases the roentgen-ray irritation might conceivably be intense enough to overtax pulmonary function and lead to death, but ordinarily the general condition of the patient remains surprisingly good. Pulmonary metastasis progresses uniformly although not always at the same rate and as the disease advances the general health fails.

DICKINSON, J. C. Radiographic findings in hepatic abscess, amebic in type. *Radiology*, April, 1925, iv, 273–278.

A description is given of 4 cases in which the roentgenographic findings were sufficiently definite to warrant a diagnosis of abscess in the right lobe of the liver, and in some of the cases, at least, surgical intervention was resorted to and the abscess drained sooner than would otherwise have been the case. Although the observations were confined to amebic abscesses it is believed that the conclusions would apply to hepatic abscesses of any type other than multiple.

The most positive evidence is obtained roentgenoscopically. If possible the examination should be made with the patient in the erect position. Roentgenograms are of value especially for purposes of record, but they do not compare with the roentgenoscopic examination. The right diaphragm is elevated from one to several intercostal spaces and its excursion is limited or absent. The right costophrenic angle is more acute, and when the abscess is located near the superior surface of the liver a rounded elevation can be seen on the corresponding surface of the diaphragm. The whole liver shadow is enlarged and in uncomplicated cases the lung fields are normally radiant. The limitation in diaphragmatic movement is characteristic, being the result of rigidity such as is seen in other abdominal muscles in acute inflammatory conditions within the abdomen. Pneumoperitoneum was not tried because of possible hazards.

If there is a rupture of the hepatic abscess into the pleural cavity the roentgenoscopic picture is very much changed. If the rupture is into the pleural sac there may be seen the picture either of an encapsulated or free pleural effusion. If the rupture is through both parietal and visceral pleuras there is formed an area of consolidation which usually promptly softens, forming an abscess that ruptures into a communicating bronchus.

The conditions most likely to be confsued with hepatic abscess are pleural effusion, subdiaphragmatic and perinephritic abscess. If a liver abscess has ruptured into the pleural sac resulting in an empyema, differentiation may be impossible until the pleural cavity has been drained. Differentiation from perinephritic abscess may be confusing and in one case a pyelogram was necessary before a diagnosis could be made.

DRETZKA, LEO. Fractures of the foot. *Surg., Gynec. & Obst.*, April, 1925, xl, 522–523.

In a series of 2,440 injuries are listed 332 fractures and of this number 72 are fractures of the feet, demonstrating the resistance of the foot structure to injury. Knowledge of the manner in which the foot injury was received is of diagnostic value but the one absolute rule in examination is the roentgenographing of the foot from every possible angle. Many cases of sprained ankle have been cases of fracture of the astragalus.

In falls the astragalus is in most instances broken at the neck—its weakest part. If the foot is dorsiflexed, the anterior articular edge of the tibia may split it across. The resulting disability is extreme. If the fragments are badly displaced excision is necessary. Removal of all or part of the bone gives fairly good functional results.

The heel bone is fractured by a fall on the sole of the foot as well as by a powerful contraction of the gastrocnemius muscle. The variety of fracture resulting is a large posterior heel piece or a general crushing of the central or anterior two-thirds. The symptoms are pain, swelling, change in the level of the malleoli and crepitus. Open operation may be necessary with suturing and pinning together of the fragments. Simple tenotomy may be the only treatment necessary in some cases. The period of disability may be as long as six months and in serious cases impaired pronation and supination of the foot may persist for a longer period. The metatarsal bones and the phalanges are invariably injured by direct violence. The first metatarsal, although the strongest, is most frequently broken because it carries a large proportion of the body weight and receives much violence in falls associated with eversion of the foot. The fifth metatarsal, because of its exposed position, comes next in frequency of injury. Fracture of the third metatarsal is apt to destroy the arch of the foot. After reduction of the fractured bones the foot should be placed in a posterior molded plaster splint with maintenance of the foot arch. Early massage and baking is important. Compound infected cases require drainage and much attention to minimize necrosis.

EISENBERG, CURT. Tumor-like structures in a shoulder joint. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 37–38.

The patient, sixty-five years old, had had a severe fall upon the left arm and shoulder thirty years previously. The present examination disclosed a slight crepitation in the left shoulder, but limitation of motion was absent. There was a circumscribed pressure pain in the left trapezius. In the roentgenogram of the left shoulder joint was seen a lengthened, eroded joint-socket, and jagged marginal eminences showing especially in the back. The articular space is narrow, cartilage appears to be absent, and the head appears to have a mushroom deformation. An unusual aspect of the roentgenogram was the appearance of oval, partly superposed shadows of the size of a hazelnut suggesting lime shadows or those of bone tumors located away from the joint close to the callum scapulae. The etiology of these tumor-like shadows is not clear. Syphilis seems to be excluded; likewise calcium diathesis. It may be that the old injury was in some way responsible for this peculiar formation. These shadows very much resemble old calcified glands.

EDWARDS, HAROLD C. A case of opaque intracranial tumour treated by subtemporal decompression. *Brit. J. Radiol.*, March, 1925, xxx, 102–104.

The case occurred in a man aged twenty-three. The roentgenogram of the skull showed immediately above the external auditory meatus and slightly upwards and backwards from the posterior end of the orbital plate, an irregular shadow. This shadow extended anteriorly toward the orbital plate. In the anteroposterior view the shadow was seen to the left of the middle line in the position of the left frontal sinus and root of the nose. The patient suffered from intense headaches and loss of equilibrium. Apart from the double optic neuritis there were no other physical signs. A right subtemporal decompression was performed with incision of the dura mater. The recovery from the operation was uneventful. The patient was re-examined a year later and found to be free from recurrence of headaches and dizzy attacks. The hernia cerebri appears smaller than when seen six months previously, pulsates well and gives no trouble.

The case probably is one of calcified endothelioma. The history excludes syphilis, and a tuberculoma appears unlikely. Pyogenic abscess is improbable because of the position of the tumor, and the normal cerebrospinal fluid count is against all three. Glioma is a possibility but the well-defined edges of the posterior aspect of the tumor favor the diagnosis of endothelioma. Sarcoma is improbable. The tumor is not in the position of the pineal gland and its irregular anterior margin excludes the possibility of cysticercus. The mere presence of calcification is an indication of a favorable prognosis.

GRAHAM, E. A., COLE, W. H., and COPHER, G. H. Cholecystography. *J. Am. M. Ass.*, April 18, 1925, lxxxiv, 1175–1177.

In several hundred cases injections have been made with halogenated phenolphthaleins for cholecystography. The chief criticism that has appeared has been concerned largely with the toxic actions. It is believed that these will be largely eliminated by the use of the tetraiodophenolphthalein compound instead of the tetrabromphenolphthalein. The procedure is particularly valuable in those cases of early cholecystitis in which clinical and other methods of examination leave doubt as to the diagnosis.

The dosage recommended is 0.053 grams per kilo in the human being for satisfactory shadows. This dose is considered at least one-fourth that necessary to produce pathogenic lesions. Sections of the human liver do not show any lesions after injections of this compound in the doses used for cholecystography. The shadows produced by the tetraiodophenolphthalein compound were fully as satisfactory as those obtained with the tetrabrom compound.

The reactions occurring after the injection of the tetraiodo compound were distinctly less marked and fewer in number than those resulting from the tetrabrom compound. The results obtained were uniformly more constant and reliable when the compound was administered intravenously than when oral administration was attempted.

A report made a year ago stated that the tetraiodo compound had been tried but was found too toxic. The authors now find that the toxicity was apparently caused by an impurity, because the present preparations are no more toxic than the tetrabrom compound.

HENDERSON, MELVIN S. Pseudarthrosis of the tibia in children. *J. Bone & Joint Surg.*, April, 1925, vi, 340–345.

Pseudarthrosis, or non-union of fractures is fortunately rare. It is a condition the cause of which is unknown and which is characterized by absence of tendency to repair. It is particularly difficult to deal with at any period of life but in infancy and childhood it is among the most difficult that the surgeon is called on to treat.

The usual situation in the tibia is at the junction of the lower with the upper two-thirds of the shaft. The treatment of these cases is very unsatisfactory.

A summary is given of results obtained in 19 cases of pseudarthrosis of the tibia developing in children. Definitely congenital cases with absence of bone are not included. Five cases were congenital or birth fractures. These have remained ununited. An additional 8 cases were found in infancy and early childhood and these also have remained ununited, the treatment proving unavailing. In the group of 6 patients whose fractures were sustained in middle or late childhood operation resulted in 5 cures. The one case failing to result in union was operated on under puberty.

A review of these cases indicates that the later in childhood the fracture is sustained, the better the prognosis under surgery. Amputation is not justifiable for if these children are carried beyond puberty their fractures become more amendable to surgery.

HULLSIEK, HAROLD E. Posterior dislocation of the foot without fracture. *Surg., Gynec. & Obst.*, February, 1925, xl, 256–257.

A report is given of a case of backward dislocation of the entire foot at the astragalotibial articulation, without fracture, in a laborer aged sixty-one. The dorsum of the foot was shortened and there was an abnormal prominence of the front of the angle formed by the anterior margin of the tibia. Both malleoli were anterior to their normal position. The heel was lengthened and very prominent and the line formed by the tendo achillis was extremely concave. The foot was held in moderate plantar flexion. The deformity was corrected as follows: The knee was flexed to relax the Achilles tendon, following which the foot was put in a position of extreme dorsal flexion with force applied from behind acting downward upon the heel. The plaster cast was applied with the foot in slight dorsal flexion. Recovery was complete.

JOSTES, FRED A. Diagnosis and treatment of benign cystic and fibrocystic diseases of bones. *J. Bone & Joint Surg.*, April, 1925, vi, 251–270.

There is no agreement as to the etiology of this condition of the bones. Some hold that trauma of some sort is responsible, while others maintain that faulty metabolism may be responsible for cyst formation. Five cases are described in detail. As a rule the long bones are chiefly affected, especially the proximal end. In the present group of cases the femur was involved three times, the humerus once, the pelvis once, also the metatarsal in one case secondary to the lesion in the femur. The age of incidence varied from ten to sixteen years, confirming the fact that this is primarily a disease of adolesence. Three of the cases had cysts with a definite connective tissue lining; one case had multilocular cysts without connective tissue lining, a rare case. One case had a bone shell filled with a solid mass of ostitis fibrosa.

It is generally agreed that the proper treatment for cystic disease of the bone should consist of conservative curettement. Radical resection is contraindicated. If altered bone tissue and abnormal vessels are removed there is left a clean cavity that may be filled up with normal compact bone. No single clinical feature will absolutely lead to a diagnosis of this condition. A careful history and physical examination are necessary. The age of incidence, the rate of development of the lesion, the lack of pain, presence of fracture, and lastly the roentgenographic examination are essential in making an accurate diagnosis. Not infrequently an exploratory operation may be necessary to lead to a definite diagnosis.

KIDNER, F. C. Coxa vara in adolescence. *J. Bone & Joint Surg.*, April, 1925, vi, 241–250.

Coxa vara adolescentium is a distinct entity. This occurs usually at about the age of puberty in a healthy but usually over-fat child. The limp that develops may or may not be associated with a history of a fall or strain. The limp is accompanied by some soreness in the hip or knee and this "leg-ache" frequently is present after going to bed. Differential diagnosis must be made from tuberculosis, Perthes' disease, fracture of the neck, and traumatic separation of the epiphysis. Fracture and traumatic epiphyseal separation occur in children, but their history is entirely different from that of coxa vara and they present a physical picture of acute injury.

The roentgenographic appearances in coxa vara are entirely dependent on the time elapsed since the onset of the trouble. Very early in the disease there is a blurring of the epiphyseal line with slight upward and backward displacement of the neck with regard to the head at the epiphyseal line. There is a sort of cupping of the head with rotation downward and backward of its articular surface. In the moderately advanced stage the epiphyseal line has disappeared. There is further displacement upward and backward of the neck, which seems to be impacting itself in the further rotated head. There is slight absorption of lime salts in the head, and less in the neck.

In the late stage of the process, after pain has disappeared, there is seen a new deposit of lime in the head and neck, with reappearance of the epiphyseal line. There is also new bone formation like callus, bridging across from the capsized head to the neck all around its periphery. The last stage is that of a complete process with full union of the head and the neck. A truss of new bone continuous from the lower edge of the epiphysis reaches along the lower surface of the neck for a greater or less distance, which depends on the amount of the original displacement. A second truss of new bone with convexity upward forms the upper union of the head and neck. This gives the appearance of an actual bend in the neck of the femur.

A series of 6 cases is described. It is believed that a disturbance of nutrition, probably due to endocrine disturbance, is the cause of this condition and not rickets or trauma. When taken early, reduction of the displacement can be obtained and if this reduction is maintained long enough complete anatomic restoration and perfect function are attainable.

LEWIN, PHILIP. Osteitis deformans (Paget's disease). *J. Bone & Joint Surg.*, April, 1925, vi, 279–285.

A description is given of a case which represents the third one on record of pathologic fracture with union, which is of interest from the standpoint of bone pathology and repair. The patient was a woman, aged seventy-four. The roentgenogram revealed a fracture of the right femur at the junction of the middle and upper third with upward, inward and forward displacement of the lower fragment. The lower two-thirds of the fractured femur and the entire left femur, together with the skull, are typical of Paget's disease. There were marked changes in the distal fragment. The shaft of the bone was markedly widened and there were a great many bands of thickening extending downward from the level of the fracture. This fracture probably was due to pathologic changes in the bone. The changes in the vertex of the skull showed both rarefaction and osteosclerosis. The parietal and occipital bones were greatly thickened.

Treatment consisted in the application of Lane plates held in place by Parham-Martin bands. Medication consisted of thyroid extract, phosphorized cod liver oil, and calcium lactate. The diet included large quantites of milk and fresh vegetables. Direct sunlight was utilized whenever available. At the time of discharge, the roentgenogram showed consolidation of the fracture and the patient was able to walk short distances without brace or cane.

LOSSEN, HEINZ. Traumatic adhesive peritonitis. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 68–76.

A series of 6 cases is briefly described in which the roentgenological study of the abdominal picture and motility combined with clinical observations served to establish the diagnosis of peritonitis with adhesions. The most striking picture is the lengthening of the stomach which lies pressed close to the liver with the pylorus elevated. The caudal pole of the stomach is only a short distance above the umbilicus. Less frequently the stretching of the stomach is in the direction of the spleen. Naturally the diagnosis of traumatic adhesions has to be made with strict adherence to the clinical and surgical findings. The absence of symptoms of adhesions in the roentgenological picture does not always exclude the absence of actual anatomical reasons for the complaint of the patient.

MAYER, E. G. Three further cases of congenital atresia of the external ear. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 50–51.

The first case occurred in a child three years old having a malformation of the right ear. The attic and the external auditory channel were found greatly narrowed interiorly. This was caused by an excessive hyperplastic condition of the head of an enormously developed styloid process lying between the pyramids and the os tympanicum. There was no hypoplasia in the latter and the pars mastoidea likewise appeared normally developed.

In the second case the child, eleven years old, had a bilateral malformation. The roentgenogram showed normally formed pyramids and labyrinth organs. The external auditory passage was narrowed to a one millimeter slit by extensive hyperostosis of the posterior and anterior walls. The os tympanicum was much sclerosed and hyperplastic. There was also found a slight forward and lateral shift of the sinus and a pronounced widening of the internal auditory passage, probably as a result of the chronic endocranial hyperplasia as shown by a distinct increase and deepening of the impressiones digitale.

The third case was a bilateral malformation in a woman twenty-five years old. The auditory passage was found to be narrowed to a slit without an unusual thickness of the walls. The cause of this narrowing was a great hyperplasia of the mastoid process which contained many large pneumatic cells. The distance of the posterior wall of the temporo-maxillary articulation from the posterior edge of the mastoid

process was only slightly more than 0.5 cm.; and in this narrow space was squeezed a hypoplastic os tympanicum. The styloid process was normally developed. In 7 out of 8 cases of such malformations described to date, only one case occurred in a male.

MAYER, E. G. The roentgenological demonstration of fractures of the base of the skull. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 52–54.

This demonstration is not very difficult, but requires a certain notion as to where to hunt for the fissures and then apply the best available technique to reveal them. One important point to remember is that the direction of the fractures in the base of the skull is in direct line with the direction from which the trauma was inflicted. This suggests at once whether to hunt for longitudinal or oblique fissures. In cases of compression of the skull longitudinal compression produces longitudinal fractures, while lateral compression results in cross fractures. These fractures always run through the cranium from one pole of pressure to the other, often traversing two or more cranial fossae whereas fractures caused by unilateral compression, i.e., by blow, upon the unsupported skull are shorter and seldom extend beyond a fossa.

The lateral position usually employed for roentgenographing the sella turcica is a good one for demonstrating fractures in the parietals, temporals, ala magna and corpus ossis sphenoidalis. Some experience is necessary in detecting fractures of the temporal pyramid because the shadow of a branch of the median meningeal artery may often have a resemblance to such a fracture. Moreover pneumatization introduces a second difficulty. In sclerotic or spongious bones fractures are as easily demonstrable as in the cranial wall, but they are lost almost completely in pneumatized bone. Usually hemorrhage into such fractured air cells may be definite indication. These longitudinal fissures of the pyramid appear to be the most frequent fractures of the base of the skull, and they usually produce strikingly mild symptoms in the patient. The petrous portion of the temporal bone with its many cavities also presents an especially vulnerable site to injury because of its low resistance, and its exposed position.

In longitudinal fractures of the base of the skull the pyramids are also usually involved. Frequently the lines of fracture pass through the labyrinth and there branch off, rarely to the apex. Fractures of the posterior cranial fossa are easily demonstrated, while those of the anterior portion present difficulties if they do not reach to the forehead since the orbital roof is usually very thin. When the optic canal is involved, a slight modification of the Rhese technique will demonstrate the fracture.

MILLIKEN, GIBBS, AND WHITAKER, L. R. The clinical use of sodium tetraiodophenolphthalein in cholecystography. *Surg., Gynec. & Obst.*, May, 1925, xl, 646–653.

The evidence presented demonstrates the superiority of sodium tetraiodophenolphthalein over the tetrabrom salt in cholecystography. It has been found that 0.045 gm. of the salt per kilogram of body weight will cast a distinct shadow in the normal human subject. This was used in a series of 40 cases, and reactions of headache or vomiting occurred in only 4 of the individuals. It has since been found that a ratio of 0.040 gm. per kilogram of body weight still gives satisfactory shadows and this quantity should be even less likely to cause reaction.

To roentgenograph the gall-bladder the patient is placed face down with the right arm extended above the head and the left held parallel with the body, the head being turned to the left. The Potter-Bucky diaphragm and a 30 ma. radiator Coolidge tube are used. The exposure is made in the costovertebral angle at 20 in. target-film distance. The time of exposure is 3 to 7 sec., according to the thickness of the patient's body. A 5 in. spark gap with 30 ma. current is used as a routine. Films are taken at 6, 9, 12, 24, and 36 hours after injection of the salt. The gall-bladder shadow may be distinctly seen under the roentgenoscope at the 9 hr. period. This procedure allows palpation of the gall-bladder for tenderness and mobility. In some cases the patients were given barium mixture and the exact relation between the duodenal cap and the gall-bladder determined. The barium, however, obscures the gall-bladder shadows in subsequent plates.

In the normal individual the gall-bladder shadow swells to the maximum in from 6 to 9 hours and then gradually diminishes in size. After food is given a quick reduction in size of the shadow occurs indicating probably a sudden contraction of the bladder and outpouring of bile for digestion. Consequently after the 9 hr. film food is usually given to the patient to test the normal function of the gall-bladder.

The conditions indicating pathological gall-bladders have been (1) failure to produce a shadow owing to cystic duct obstruction or severe chronic cholecystitis; (2) gallstones which are seen merely as "negative" shadows in the cholecystograms; (3) failure of the normal expansion and contraction of the gall-bladder, and (4) distortion of the shadow due to causes in or about the gall-bladder.

The diagnosis of pathological conditions of the gall-bladder by means of cholecystography has been found correct in 95 per cent of a series of 20 cases proved at operation, while the clinical impression in the same series was correct in only 65 per cent.

MOORE, B. H. Sacralization of the fifth lumbar vertebra. *J. Bone & Joint Surg.*, April, 1925, vi, 271–278.

Examination of 87 cadavers and skeletons disclosed sacralization in 3 cases, or 3.4 per cent. The anomaly was unilateral in all. One of the specimens was dissected and studied. The sacralized side shows a definite joint apparently of the same type as the sacroiliac joint. The general impression given by the specimen is that the sacralized side is much more securely anchored than the other. The foramen for the exit of the fifth lumbar nerve on the sacralized side is much wider than on the other. The lumbo-sacral angle is somewhat greater than the normal. From the posterior surface there is a failure of union of the spinous process of the first sacral vertebra. The striking thing observed is the apparent solidity and strength of the sacralized side as compared with the other. It would seem that this would be less subject to injury and strain than the normal side although in unilateral sacralization there might be a factor of unbalanced strain which might cause trouble.

In addition an examination was made of 1,104 plates of the lumbo-sacral region from the roentgenographic standpoint. In the entire series there were found 37 cases of sacralization, either unilateral or bilateral, a percentage of 3.35. In this group of plates, there were 340 from children which revealed 13 sacralizations, 3.8 per cent. In younger children, because of incomplete ossification, the appearance is very different from that presented in adults. The body of the fifth lumbar vertebra is not set so deeply between the ilia as in the adult. The tips of the transverse process appear bent down to meet the sacrum so that the fifth lumbar vertebra with its transverse process has the form of a flattened arch. Only later on does the upper wing of the transverse process become sufficiently ossified to give the typical butterfly wing appearance.

It was discovered incidentally that bifid spinous processes of the fifth lumbar and first sacral vertebrae occurred in 5.34 per cent of all the roentgen plates studied. In 5 cases it was associated with sacralization. The anomaly is nearly twice as common as sacralization.

Clinically, sacralization was observed in 40 cases. Thirteen were found in children incidental to roentgenographic examinations for other conditions. In the 27 adult cases, 7 were accidental discoveries, while 6 of the remainder were suffering from definite sciatic pain. Most of the patients were laborers doing heavy work and all had other factors, such as infected teeth, etc., which might account for the pain. In 4 cases operative removal, which was only partially successful resulted nevertheless in complete relief from pain.

NAFFZIGER, HOWARD C. A method for the localization of brain tumors—the pineal shift. *Surg., Gynec. & Obst.*, April, 1925, xl, 481–484.

A study of roentgen-ray plates undertaken with a view to determining the percentage of individuals having calcified pineal glands shows that various factors, principally age of the patient and character of the roentgenogram, are of importance. If a large number of children are included, the percentage of calcified pineal glands is of course much decreased. In a study of 215 consecutive cases, the pineal was calcified in 97 (45 per cent). Of 45 cases under twenty years of age, 7 (15.5 per cent) had calcified pineals. Of 96 cases over twenty years of age, 56 (58 per cent) had calcified pineals. In general, it has been found that about 50 per cent of cases show sufficiently calcified pineal glands to be of diagnostic value.

The pineal shift as determined by roentgen examination will frequently localize a brain tumor. This method has been of value in confirming opinions based upon neurological examination, and it alone has frequently made the diagnosis possible. It is a matter of common observation at autopsy that the portion of brain containing a growth is greatly increased in volume. This is due both to the presence of the lesion and to an increase in the fluid content of this hemisphere. In such conditions it is not uncommon to find the affected hemisphere one-third larger than the opposite side, resulting in a very striking distortion of the mid-line structures. Subacute and acute conditions such as abscesses and hemorrhages have given the characteristic shift. Stereoscopic plates are of great help in recognizing even slight dislocation of the pineal shadow from the mid-line.

In order to obtain a clear shadow of the pineal the ray is directed in the mid-line parallel to a line drawn between the external canthus of the eye and the external auditory meatus. The pineal shadow is thus projected well above the sinuses. The patient lies face up with the occiput against the film, as the pineal gland is somewhat closer to the back of the head. The tube is carefully centered so that the central ray passes along the mid-

saggital plane. Developmentally the pineal is a true mid-line structure. It has been shown in the presence of intracranial pressure that where the lesion is located in the right cerebral hemisphere the pineal shadow has been shifted toward the opposite side. The degree of shift varies considerably, being commonly about one centimeter, although cases were observed in which it was 2.5 to 3 cm. away from the mid-line. When the gross lesion is on the left side the pineal is shifted to the right. The shift has been present whether the growth has been frontal, parietal or occipital. When the intracranial pressure is uniform throughout the brain there is no lateral shift of the pineal shadow. The above observations have been proven in 15 cases by operation or autopsy. Four cases are briefly described in which the pineal shift was studied. In the chronic form of intracranial pressure as due to tumor or abscess, the persistence of the pineal in the mid-line means internal hydrocephalus. This has been found occurring in lesions of the posterior fossa and distortion of the third and fourth ventricles.

VERBRYCKE, J. RUSSELL, JR. Eventration of the diaphragm. *Surg., Gynec. & Obst.*, March, 1925, xl, 415–420.

A report is given of 7 cases, 2 of well marked eventration and 5 of slight elevation, sometimes termed rudimentary eventration. The condition is usually unaccompanied by any direct symptoms. The patient may seek medical attention for some of the secondary conditions such as displaced viscera; but no symptoms have ever been observed which may be said to be very characteristic or in any way diagnostic. The roentgen ray is essential in making a diagnosis of eventration. To make a positive diagnosis one must see the clear unbroken line of the dome of the diaphragm high in position. It is necessary to show that the stomach and diaphragm may be separated which is sometimes possible only with the aid of pneumoperitoneum. There is usually a limited respiratory excursion of the affected side. If paradoxical movement of the diaphragm is noted, i.e., descent with expiration and ascent with inspiration, the weight of evidence would be for hernia and against eventration, but this sign is not pathognomonic.

Prognosis depends a good deal upon the individual patient. Eventration is not particularly dangerous and may not be much of a physical handicap.

Treatment must usually be aimed at the correction of complications of concomitant conditions or toward the amelioration of symptoms.

WOLFSON, WILLIAM L. Diverticulum of the bladder causing dystocia at labor. *Surg., Gynec. & Obst.*, April, 1925, xl, 524–527.

The obstetrician encounters many causes of dystocia. In the present instance a diverticulum of the bladder apparently interfered with the descent of the fetus. This diverticulum, about 2.5 by 4 inches in size, situated beneath the bladder and at the left broad ligament and extending from the lateral border of the uterus to the left pelvic wall, by its situation and size caused an abnormal labor. It prevented the fetal head from coming through the pelvic brim and necessitated a forceps extraction. In the course of the labor and delivery the diverticulum was traumatized and then became infected. There then followed pyuria, frequency and ardor, together with systemic manifestations of chronic septic infection. Cystoscopic examination revealed a moderate general cystitis and trigonitis. The ureteral orifices were normal. Catheterized urines from both kidneys were clear. Above the interureteric fold about 2 cm. to the left of the median line was an opening 0.5 cm. in diameter from which thick worm-like pus was being extruded. The cystograms confirmed the diagnosis of diverticulum. The diverticular sac was removed and the patient recovered with excellent control of her bladder.

WYARD, STANLEY. Some observations on the condition sometimes called leather-bottle stomach. *Surg., Gynec. & Obst.*, April, 1925, xl, 449–459.

The name leather-bottle stomach cannot be used to connote any particular histological structure and merely describes a certain macroscopic change in the stomach. It is not a clinical or a pathological entity. Diffuse fibromatosis or diffuse carcinomatosis are suitable names which designate the two conditions included by the original term. A description is given of 3 cases of local fibromatosis of the stomach. Clinically the condition is indistinguishable from cancer of the pylorus. The condition may have originated as a sequel to syphilis, tuberculosis, neoplasm or inflammation. The most probable cause appears to be a primary neoplastic fibromatosis upon which is subsequently engrafted an inflammatory element. The symptoms show considerable resemblance to those of carcinoma. Roentgenography will confirm the pyloric stenosis and gastric dilatation. The disease will probably always be diagnosed as carcinoma as there are at present no means of distinguishing the two conditions apart by gross inspection. In any event, the treatment is the same, namely,

surgical removal. The disease if untreated inevitably proves fatal.

The above described local condition is apparently progressive and occasionally involves a large portion of the stomach wall. Whether it commences locally and spreads, or whether from the beginning it is of wider distribution is not as yet determined. When the whole organ is invaded a typical leather-bottle results. A detailed description of such a case is given. As has been stated, diffuse carcinoma of the stomach also yields a leather-bottle stomach. The neoplastic growth may be a scirrhous carcinoma, a cylinder cell carcinoma or a colloid carcinoma. Each of these types is illustrated by a case.

ROENTGEN AND RADIUM THERAPY

CHILDS, SAMUEL B. Appendicitis and lesions complicating its diagnosis: Deductions from *x*-ray examinations. *Radiology*, February, 1925, iv, 107–110.

The appendix is visualized in over 70 per cent of cases when barium is taken by mouth. Probably some of the non-visualized appendices are postcecal. A roentgen diagnosis of chronic appendicitis without a visualized appendix is unreliable and unwarranted. It is important to rule out as far as possible any coexisting lesion in the gastrointestinal tract. The roentgenographic signs of appendicitis in their order of reliability are: (a) a visualized appendix constantly tender to palpation; (b) a persistent kink or angulation in the appendix; (c) delayed emptying; (d) a bulbous tip with small lumen near the cecum. Fixation of the appendix by adhesions is not alone considered sufficient indication for its removal. Presence of concretions is contributory evidence of pathology. A segmented appendix is not considered a reliable sign.

The lesions complicating the diagnosis of appendicitis are numerous. Some of these are: tubal-ovarian disease, calculus of the kidney or ureter, gastric or duodenal ulcer, cholecystitis, Lane's kink, Jackson's membrane, diaphragmatic pleurisy, a dilated cecum and ascending colon with sharp hepatic flexure, cancer and tuberculosis of the cecum, mesenteric lymphadenitis and so-called neurotic or irritable abdomen.

COFIELD, ROBERT B. Syphilis of the spine. *Radiology*, February, 1925, iv, 104–106.

Syphilis of the spine may manifest itself (a) as arthralgia or backache, (b) as necrosis of the vertebrae, and (c) as Charcot spine accompanied by cerebrospinal degeneration. It is not unusual to find the arthralgic type in either secondary or tertiary syphilis, but the gummatous type and Charcot spine are found only during the later stages.

The arthralgic type is not disclosed in the roentgenogram of the spine, since there are no destructive lesions of the vertebrae and it is almost impossible to demonstrate periarticular swelling or effusion into the joints.

The gummatous type of spondylitis may affect any part of the vertebrae, but like tuberculosis is more apt to attack the cancellous tissues and early in its progress it destroys the intervertebral disc. The lumbar, cervical and dorsal regions are the most frequently attacked in the order named. While new bone formation dominates the roentgenological picture in bone syphilis generally, this is not necessarily true in syphilitic spondylitis of the gummatous type. During the early stages of bone destruction hypertrophic changes may be absent. In the advanced stage, new bone formation may accompany the destructive process, resulting sometimes in complete bony ankylosis of a number of vertebrae. Differentiation of gummatous spondylitis from tuberculous spine is often very difficult. Charcot disease of the spine is not frequently encountered. It is recognized now as being invariably due to syphilitic infection which has previously produced a cerebrospinal degeneration. There is often marked deformity of the spine with little or no pain. The roentgenogram shows irregular destruction of the vertebrae with extensive new bone formation. The diagnosis of Charcot spine is not usually difficult, but differentation may be necessary from Pott's disease, hypertrophic osteoarthritis, syringomyelia, malignancy, old compressed fractures and Paget's disease.

DEBICKI, J. J. The roentgen treatment of laryngeal tuberculosis. *Strahlentherapie*, 1924, xviii, 161–176.

The curative effect of roentgen rays on human laryngeal tuberculosis is undeniable and clearly demonstrated in the 16 cases briefly described here. The treatment is characterized by a disappearance of pain, infiltration and ulcerations. The circumscribed forms of the disease respond most readily but the severe destructive type can also be cured.

Most of the cases also had a more or less advanced stage of pulmonary tuberculosis, but no influence could be observed upon the ability to heal of the larynx tuberculosis. Human larynx tuberculosis can best be treated

by a roentgen dose of 5 Holzknecht units measured at the skin, applied through 4 mm. Al upon two fields percutaneously. These two fields are irradiated once a week, with a pause of four weeks between series of treatments. In refractory cases, it is advisable to introduce a pause of six to eight weeks before continuing treatment. Temporary aggravation of the condition in a case should not be feared. The roentgen treatment is effective in both the productive and destructive forms of tuberculosis of the larynx, although it is admitted that the destructive type of the disease is not always amenable to radiation therapy.

DIAMOND, JOSEPH S. The niche as the roentgen sign of duodenal ulcer, with a report of 42 cases. *Radiology*, February, 1925, iv, 93–100.

It was found that the ordinary roentgen examination seldom revealed the presence of niches and that the associated muscular spasm usually interfered with the filling of the ulcer pocket. The roentgen deformities of duodenal ulcers may be classed as niche, defect, bulb retraction and diverticulum formation. These may occur singly or in combination.

The niche may vary from a simple, non-indurated mucous ulcer to the penetrating and callous ulcer. Its filling and visualization are dependent on the degree of irritability of the surrounding musculature. By causing a relaxation of the duodenum through use of belladonna in conjunction with suitable dietary measures, the filling of the ulcer pocket becomes greatly facilitated. In the present series, 28 of the cases (67 per cent) could be visualized and interpreted after relaxation of the musculature had been accomplished. Of these, 21 occurred on the lesser curvature, 6 on the greater, and one was on the mid-surface. The functional deformities are (a) incisura or segmental contraction appearing usually on the greater curvature opposite the lesion, and (b) a puckering contraction in the immediate vicinity of the niche.

Organic defects are usually found on or close to the lesser curvature border. They are irregular in outline, constant in size and uninfluenced in size or shape by relaxation of the duodenum. A functional or spastic defect is due to the contraction of the circular muscle fibers in the same segment as the ulcer. This defect is rounded in outline, is broad and often very deep and has smooth borders giving the appearance of a finger print. It changes in size and is greatly influenced by antispasmodics. It is almost invariably found on the greater curvature of the duodenum opposite the ulcer. Organic causes play but a minor part in the formation of defects which are always accompanied by the spastic factors which are the predominating component. The presence of a spastic defect on the greater curvature side always indicates an ulcer in the same segment on the opposite side even though such an ulcer may not at once be visualized. In this series, 35 cases (85 per cent) presented defects, and 18 were associated with niche. Functional defects were observed in 27 of the 35 cases.

The bulb retraction in duodenal ulcer bears some analogy to the gastric retraction occasionally seen in the saddle ulcer when the lesser curvature is shortened and curled upon itself. In the present series retraction was found associated with niche in practically every instance. Diverticulum associated with duodenal ulcer may often be mistaken for niche. It can be differentiated by the ability to contract and change in contour. The diverticula are always situated proximal to the ulcer and they are usually found in the basal portions of the duodenum. Such diverticula were found in 8 cases in the present series.

GRIER, G. W. The treatment of malignancy of the eyeball. *Radiology*, February, 1925, iv, 125–127.

For purposes of treatment, malignant tumors of the eye may be divided into two groups: (1) epibulbar tumors or those occurring on the ocular conjunctiva; (2) intraocular tumors. Those of the first group are superficial with little tendency to penetrate into the globe or to metastasize. They are usually discovered early and therefore usually receive early treatment. Their superficial location makes the application of radiation simple and effective. Lesions in the second group grow rapidly, often penetrate the coats of the eye and involve the orbital tissues. They are prone to metastasize and are often of large size before they are discovered. Their deep location and the involvement of surrounding tissues makes them much less susceptible to radiation.

In the treatment of epibulbar tumors roentgen rays are far preferable to radium. All of 11 such cases treated with roentgen rays are reported well, 4 of them having passed the five-year period. In general, the roentgen treatment consisted of unfiltered rays of a penetration corresponding to a 7-inch parallel spark gap. The radiation was applied for 3.5 minutes from a distance of 10 inches, using 5 ma. This treatment was repeated every other day until four treatments were given, and the patient was then rested for three or four weeks. A series of such treatments corresponds to a little more than an erythema dose and produces no unto-

ward effects. The procedure is repeated as often as is necessary to cause the complete disappearance of the lesion.

The prognosis in any of the intraocular tumors is bad, and the only hope of treatment is to secure palliation. Until some better method of treatment is discovered exentration followed by radium in the orbit and deep roentgen-ray therapy of the outside offers the patient the best chance for recovery. Out of 9 cases of this nature treated, 6 are dead, 2 are still under treatment and one is apparently free from disease. The radium treatment consists of 100 mg. filtered through 1 mm. brass and wrapped in 0.5 inch of gauze and left in place for ten hours.

FRICKE, ROBERT E. Possibilities of deep *x*-ray therapy with the Coolidge water-cooled tube and heavier transformers. *Radiology*, February, 1925, iv, 111–115.

Special, heavy transformers were secured for the operation of the new Coolidge water-cooled tube. A complete water circulation under 40 to 50 lb. pressure is used, and the roentgen tube is kept at an even, low temperature during its operation by a flow of water through the coil of copper pipe behind the tungsten target. The roentgen tube is 8 in. in diameter and has a projecting molybdenum pin in the filament spiral which produces a more uniform heat gradient by producing a large focal spot This machine has been operated at 250 kv. and 50 ma., but for treatment purposes 240 kv. and 40 ma. are used. Comparative electroscopic measurements show that the new device possesses 20 times the power generated by the old machine; in other words, a treatment can be completed in $\frac{1}{20}$ of the time previously consumed. In 30 cases treated to date, there has appeared little roentgen sickness even though multiple portals were irradiated at the same sitting.

Dosage measurements must become more and more accurate as the intensity and penetration of the radiation becomes greater. It is predicted that the spark gap estimation and energy input valuation will become obsolete. The Friedrich iontoquantimeter, the Seemann spectrograph and the Dessauer electroscope are types of measuring devices that have to be used for measurement of dosage.

Because of the high power required by this machine, all high tension apparatus should be placed below ground. The machine demands careful attention, and in the administration of radiation, great care must be exercised to prevent overdosage.

GRAHAM, E A., COLE, W. H., AND COPHER, G. H. The roentgenological visualization of the gall-bladder by the use of intravenous injections of sodium tetrabromphenolphthalein. *Radiology*, February, 1925, iv, 83–88.

The previous recommendations of the authors that the calcium salt is preferable to the sodium salt of tetrabromphenolphthalein was based on erroneous observations. The sodium salt is the more desirable because it can be given in a relatively small volume of water, whereas the calcium salt is much less soluble. The main essential for securing a good shadow with the tetrabromphenolphthalein is the with-holding of food from the patient. It appears that food in the stomach and intestines stimulates emptying of the gall-bladder with consequent absence of gall-bladder shadow.

About 5 gm. of the sodium salt dissolved in about 40 cc. of distilled water is suitable for intravenous injection into an individual of ordinary size. Toxic effects are usually mild and it is believed that if the material can be obtained in a purer state all toxicity may disappear.

If good technique is followed the results obtained are definitely significant. The best gall-bladder shadows are obtained in normal individuals. There are cases, however, which theoretically would fail to reveal a sharp visualization of the gall-bladder. These are cases with marked disturbance of liver function. Thus in extreme cases of cirrhosis of the liver, it is quite possible that no shadow would be obtained. Further experience is necessary before the matter can be considered settled. In the roentgen study of the gall-bladder it is absolutely necessary to secure a series of plates. A single plate is practically useless. More experience is needed in the interpretation of stones in the gall-bladder, but in the 8 instances observed to date the stones were recognized by an irregular mottling in the shadow of the gall-bladder. These observations were confirmed by operation. In probably 90 per cent of the cases, absence of the gall-bladder shadow may be interpreted as evidence of gross pathology, and is of value in the diagnosis of cholecystitis.

KAHN, MAX. AND SLOAN, MARTIN F. *X*-ray and clinical study of some pulmonary lesions. *Radiology*, March, 1925, iv, 198–208.

A description is given of some pulmonary lesions possessing phases of unusual interest and better understood only after a joint study by the clinician and the roentgenologist. The cases comprise tuberculous, non-tuberculous and neoplastic diseases.

Chronic infections of the upper respiratory tract may and do produce physical and roentgenologic changes which for years have been interpreted as tuberculous lesions. The roentgenogram reveals a hazy opacity not unlike the shadow of a thickened pleura. Numerous exceptions have been found to the general belief that chronic primary basal lesions are nontuberculous. Bronchiectasis at an apex produces signs identical with those of a far advanced tuberculous lesion. Amongst the nontuberculous lesions illustrated by cases are bronchiectasis, pneumonic process, mycosis, amebic abscess and broncholithiasis.

Primary carcinoma of the lung arises from the mucous membrane of either the esophagus or trachea, and rarely from the remains of the thymus gland. Metastatic carcinoma may sometimes be late. One case was observed in which this did not occur until seventeen years, and another fourteen years after operation for carcinoma of the breast. Roentgenologically it is difficult to differentiate between primary and metastatic carcinoma. A case is described which came to autopsy and revealed carcinomatous infiltration of the pericardium and heart. Primary sarcoma is relatively infrequent, while metastatic is quite common. The metastatic shadows vary in size from that of a pinhead to that of an orange and may be single or multiple. When situated near the region of the arch of the aorta, they may be difficult to differentiate from aneurysm. Deep roentgen-ray treatment, early instituted, may delay or possibly prevent metastases to the lungs and it should be continued over a considerable period. Lymphosarcoma is manifested, as a rule, as a single wide shadow and is often difficult to differentiate from Hodgkin's disease. Hypernephroma of the lungs and mediastinum is always metastatic and very infrequent. Roentgenologically the shadows are usually multiple, often confluent and more or less circumscribed.

Dermoid cysts of the chest are comparatively rare. They are usually spherical in shape but may be flattened when in contact with the diaphragm.

LeWald, L. T. Newgrowths of the lung, primary and secondary. *Radiology*, March, 1925, iv, 212–220.

In order to avoid error, great care must be exercised in attempting to make a roentgen diagnosis of early primary or secondary tumor of the lungs or mediastinum. Benign changes such as peribronchial fibrosis or old healed tuberculous lesions should not be mistaken for a malignant condition. Repeated examinations over short intervals may be the only means of reaching a correct diagnosis. In doubtful cases of lung tumor, artificial pneumothorax should be used to establish diagnosis.

Operative procedures should not be undertaken for the removal of a tumor in any portion of the body without first having made a careful roentgen examination of the lungs for evidence of metastases. Owing to improved technique in both the clinical and roentgen examination, the diagnosis of primary tumor of the lungs is being made with increasing frequency. A few cases are briefly described.

v. Mikulicz-Radecki, F. The irradiation of suspected sarcomatous myomas. *Strahlentherapie*, 1924, xviii, 137–143.

A description is given of a case that appeared clinically to be an ordinary myoma and which because of a concurrent febrile condition was treated with roentgen rays. The tumor, however, grew in size and it became necessary to operate, and it was then discovered that the tumor was a mixed cell sarcoma, consisting of numerous giant cells in various stages and polymorphonuclear cells of most diverse size, spindle cells and single round cells. This tumor probably originated from the muscular tissue.

From the clinical features of the case it seemed proper to administer the usual dose of roentgen rays for myomas, namely 30 to 40 per cent of the skin unit dose. When, however, after three months' wait, malignancy became suspected a sarcoma dose (according to Seitz and Wintz) was administered without success. It is therefore concluded that in the case of operable sarcoma (when clinically recognized) it is unsafe to rely upon the so-called sarcoma dose of roentgen rays to control the tumor. For the present the best treatment for such cases is operation.

Molt, F. F. Oral *x*-ray diagnosis. *Radiology*, March, 1925, iv, 242–245.

The roentgen ray is of great value as a diagnostic adjunct in determining the presence and potentiality of dental foci. The oral roentgenogram should be as nearly perfect and complete as it is possible to make it if a diagnosis is to be based upon it. Three- to 4-inch penetration will give the best roentgenographic density. Films should be placed in the mouth with a minimum of bending and should be held firmly in position. It is inadvisable to try to cover too many teeth in one exposure and the ray should be directed on the axis of the tooth so as to avoid overlapping. The upper molar films should be so placed and the ray so directed that the molar shadow will not obscure

the root ends and the relation of the root ends to the antrum floor may be definitely shown.

In studying the roentgenograms it is important to remember the normal anatomic deviations which should not be confused with pathological changes. A localized radiolucence indicates an oral source of disease, while a generalized marked radiolucence indicates a systemic derangement, as for example, tuberculosis. Pathologic destruction in the mouth structures may be periapical or gingival. Roentgenographic appearance of granuloma, chronic perialveolar abscess or radicular cyst may not permit of differentiation but all may be considered potential sources of infection. The extraction of a tooth bearing a periapical mass does not necessarily eliminate the infection, and by placing the roentgenographic negative of "dead" teeth on the same plane as that of teeth periapically involved, makes the patient's health the basis of decision. This permits retention of doubtful teeth in cases showing no evidence of metastasis and makes the removal of all pulpless teeth imperative in the case of serious systemic complications. Sclerotic bone masses are frequently very difficult to differentiate from roots. Teeth may be pulpless with no periapical evidence. The mere fact of a tooth showing no canal filling is therefore no indication of its vitality and a routine vitality test of all teeth should supplement the roentgenographic interpretation.

In "pyorrhea" the roentgenogram should include some soft structures to permit proper interpretation of destruction, and the angles of exposure should bring out all interdental spaces. As a matter of fact, the roentgenographic examination without clinical exploration of pockets and determination of tissue hypertrophy is of little value, as the roentgenographic appearance of an arrested case may simulate that of one showing marked pathologic conditions.

SANTE, L. R. Acute consolidations of the lung. *Radiology*, March, 1925, iv, 221–241.

The roentgenographic recognition and differential diagnosis of the following acute consolidations of the lung are discussed: (1) pneumonia (pyogenic, lobar, hilus and broncho); (2) acute caseous tuberculous pneumonia; (3) lung abscess. These are described in detail and illustrated by numerous photographs.

Increases in density occur in the mid-portion of the chest as a result of the following conditions: (1) lobar pneumonia of the middle lobe or of the lower portion of the upper lobe; (2) acute caseous tuberculous pneumonia involving this region; (3) localized interlobar pleural effusion; (4) hilus pneumonia; (5) lung abscess; (6) bronchopneumonia; (7) pulmonary tuberculosis especially from bronchial extension of the disease already present in the chest; (8) new growths.

Increase in density involving the lower chest results from lobar pneumonia of the lower lobe, generalized effusion, lung abscess, localized pleural effusion, bronchopneumonia, new growth.

Massive shadows involving the entire chest cavity are usually due to large pleural effusions, massive lobar pneumonia, extensive tuberculous consolidation, occasionally acute caseous pneumonia, chronic diffuse mediastinal fibrosis, and primary or secondary tumors.

STEWART, WILLIAM H. Pleural effusions, general and local. *Radiology*, March, 1925, iv, 209–211.

The most common finding in simple moderate pleural effusion is an obliteration of the costophrenic sinus by a dense shadow with concave upper edge extending from the outer border of the chest to the dome of the diaphragm. As the effusion increases, the shadow gradually extends upward retaining its cup-shaped irregular upper margin until the cavity is filled, when all the lung markings are obliterated. In children, however, the effusion appears early in the axillary space, climbing up between the parietal and visceral pleura from the diaphragm to the apex. Roentgenographically it appears as a ribbon-like shadow of increased density with a sharp inner border. As the fluid increases, this shadow increases in width. Not until the inner border of the shadow reaches the outer edge of the inner zone does it tend to accumulate at the base. As the fluid increases, the heart and mediastinal contents are gradually displaced to the opposite side. This observation holds true in most children, and is seen in many adults.

The effusion may become encapsulated if adhesions are present. In many cases such sacculation can be best located by stereoroentgenograms of the chest in the erect position supplemented by lateral roentgenograms in the prone position.

Pleuritic effusions complicating pneumonia in adults are often difficult to recognize, especially if the pneumonia is in the lower lobes. At times, an interlobar process is not recognized until the general effusion is withdrawn. The differentiation between complete pleural effusion and complete pneumonia is a difficult problem since the shadows are much the same. In children the displacement of the heart to the opposite side indicates complete pleural effu-

sion and not pneumonia. Consolidation in the lower portion of the upper right lobe is often mistaken for an interlobar pleurisy. In interlobar effusion the upper and lower borders of the shadow are sharp-cut and more or less parallel, while lung consolidation is more likely to be wedge-shaped. It is often impossible to judge from roentgen-ray evidence alone whether an abscess is just beneath or just above the pleura. The clinical symptoms must be depended upon largely for a diagnosis. The three main points in the differentiation favoring pulmonary abscess are the presence of air in the cavity, the presence of induration around the cavity and the profuse foul expectoration.

TROSTLER, I. S. A pathognomonic radiographic finding in early pulmonary tuberculosis. *Radiology*, March, 1925, iv, 196–197.

In early indeterminate cases of pulmonary tuberculosis where there are as yet no lung findings, no râles, and only slight general symptoms, the combination of tuberculin test and roentgenologic study is capable of yielding valuable information. Nothing is gained by applying this procedure in advanced cases where definite symptoms are readily determinable.

The procedure is as follows: The patient receives a von Pirquet skin test to determine the amount of tuberculin he can tolerate. One or two days later the Pirquet reaction is studied and the patient undergoes a searching physical examination. A chest roentgenogram centered over the fifth dorsal vertebra is taken at or before the time of the first examination and again 48 to 72 hours after injection of the tuberculin, using a 30 ma. radiator type Coolidge tube at 30 in. anode film distance with 25 ma., 84 kv. peak for $\frac{1}{6}$ to $\frac{1}{4}$ sec. The patient is instructed to take a deep breath and the flash is made during the peak of inspiration. The films are developed at exactly 65°F. for four minutes in a fresh developing solution. It is essential that the first and second films be taken and developed under exactly comparable conditions. In some cases as much as 5 mg. old tuberculin has been used, while in others as little as 0.2 mg. has produced rather severe reaction.

Interpretation of the film presents no difficulty. When there is a reaction there is an increase in the density in the area where the focus of tuberculosis has taken on the congestion produced by the tuberculin reaction. The lymphatics around infected tuberculous glands show an infiltration about them and there are usually found areas where there is slightly increased density.

It is emphasized that this test is not to be used except by those thoroughly familiar with the effects of tuberculin.

WARING, JAMES J. The relationship of the radiological diagnosis of tuberculosis of the lungs to the clinical diagnosis. *Radiology*, March, 1925, iv, 188–195.

The shadow of the bony thorax partly obscures only one-half the lung field in the infant and about two-thirds of the lung field in the adult, according to measurements which are tabulated. The portrayal on the roentgen film of any part of the lung is largely dependent upon the air content of that portion of the lung and also upon the air content of the neighboring parenchyma. The increasingly sharp delineation of the isolated healing tubercle is a resultant of two opposing changes in density. There is increased density of the tubercle from caseation and from increased cellular content; shrinkage is due to connective tissue contraction, and calcification. There is decreased density of the neighboring parenchyma caused by absorption of peripheral intraalveolar exudate; resolution of cellular exudate and proliferated connective tissue cells in the walls of the neighboring air cells; physiological emphysema; and pathological emphysema from contraction of radial and concentric connective tissue fibers in the shrinking tubercle.

BAENSCH, W. The limits of roentgen therapy of surgical diseases. *Strahlentherapie*, 1924, xviii, 517–535.

The results obtained in carcinomas located deep in parenchymatous organs have been unsatisfactory; in tumors of medium depth such as mammary carcinomas, a portion of the cases, which were all inoperable, obtained improvement and recovery lasting three to four years. For superficial tumors, radiation therapy is the method of choice in about 80 to 90 per cent of the cases.

The duration of treatment of surgical tuberculosis may be appreciably shortened by a suitable dose, quantitative and qualitative, of roentgen rays. In chronic dermatoses such as may occur as sequel to surgical diseases the use of roentgen rays has yielded satisfactory results.

The most suitable dose for cancers seems to be the so-called 100 per cent "carcinoma dose" of Wintz. Experiments in which the attempt was made to increase or reduce this dose always caused a return to the original quantity. The dosage in tuberculosis is adjusted to the severity of the case, the dose being roughly inversely proportional to the severity of the

tuberculous process. It appears that better results are obtained in tuberculosis when the dose is administered in small fractions at frequent intervals. Irradiation through many portals is preferred to single large field irradiations.

GÁL, FELIX. So-called stimulative irradiation and certain problems of ovarian function. *Strahlentherapie*, 1924, xviii, 573–588.

A total of 15 cases (8 in virgins) of amenorrhea was treated by stimulative roentgen therapy. The radiation was administered through 3 mm. Al at 25 cm. distance, a total of 40 Fürstenau units being given through two abdominal and two sacral fields. Certain of the cases received a second dose three weeks after the first. Seven of the women treated had never before menstruated. In the others amenorrhea of four to ten months' duration was present. A successful result was obtained in 8 of the cases, 5 were unimproved and 2 lost sight of. There was no striking clinical characteristic among the patients to account for the amenorrhea. Certain of them were of the hypoplastic type—small narrow chest, and with pale skin. In some of the girls a characteristic enteroptosis was evident. More than half of the cases complained of backache. Many of the cases had underdeveloped breasts and internal sex organs.

The result of administering very small doses of roentgen rays in these cases was that about half of them with very different types of amenorrhea responded favorably. The menstruations appeared and recurred normally. An explanation of the mechanism whereby primary constitutional as well as secondary amenorrheas are affected by roentgen rays is not a simple one. One hypothesis that there is a stimulation of the growth of the specific cells in the sex organs lacks experimental confirmation since such an observation has never been recorded. Another explanation is that certain tissue breakdown occurs and released proteins stimulate ovarian function. This is considered rather improbable as it does not explain the sustained recurrence of the menstrual period. A third hypothesis assumes that certain inhibiting influences are overcome by the radiation, but there is no proof for this. Any explanation of the effect must take into account the nervous mechanism. Cases of amenorrhea may be divided into two groups; one in which there is present a still unknown factor controlling the cyclic changes, and the second in which it is not present or is not capable of stimulation. Whenever this factor is set into action by a biological stimulus such as roentgen rays or injected foreign protein it is set into motion very much like a wound up clock.

HARTUNG, ADOLPH. Diverticula of the duodenum. *Radiology*, April, 1925, iv, 308–318.

The roentgen diagnosis of diverticulum of the duodenum is dependent upon visualization of a localized paraduodenal sacculation along which the contents of the duodenum are seen to pass. The finding is usually more or less accidental since nothing in the clinical history of the patient suggests its presence. The prime essential in its detection is the filling of the sac with the opaque meal. To attain this end attempts should be made to distend the entire duodenum by compression of the duodeno-jejunal junction against the spine and compressing the contents of the stomach toward the pylorus.

Roentgenoscopic examinations should be made in the vertical, horizontal (prone and supine) and in oblique positions to render all parts of the duodenum visible. Frequently the first indication of a diverticulum is the finding of a localized residue after the stomach and duodenum are empty. Prolonged retention is often present and has been noted for as long as four days. If tenderness to pressure is elicited the suspicion of a diverticulitis is justifiable. An air bubble is sometimes found in the upper part of the sac especially when near the duodeno-jejunal junction. Whenever no other pathological condition is demonstrable clinically or roentgenologically to account for various indefinite and atypical symptoms in the upper abdomen and a diverticulum is found which is tender and retains its contents unduly long, operative measures for its removal should at least be given consideration. Inability to find a diverticulum at operation does not necessarily prove the diagnosis to have been incorrect as several cases are on record where this was the case and subsequent autopsy revealed the sac back of the pancreas or in an inaccessible location.

A series of 6 cases are briefly described and pictured.

KENNEDY, W. H. Epithelioma of the lip. *Radiology*, April, 1925, iv, 319–324.

From observations in 150 cases, it is concluded that the predisposing causes of epithelioma of the lip are undoubtedly of a complex nature and that no single agent, such as tobacco, can be held exclusively responsible for this malignant state. It has been found that radium is most efficient in the treatment of practically all cases of epithelioma of the lip, and little use was made of electrocoagulation, although in a few cases the latter gave satis-

factory results. The surface application of radium in this form of malignancy has decided advantages. Fifty mg. radium element was applied through a filter of 0.5 mm. Ag, 1 mm. brass, 1 mm. lead and 2 mm. soft rubber; an application being given for two hours each day for five consecutive days. This technique can be applied in practically all cases with the assurance of a favorable prognosis. Pictures are shown of 6 typical cases.

NEEF, F. E. The treatment of advanced cancer of the cervix by vaginal and transperitoneal implantation of glass radium emanation capillaries. *Arch. Clin. Cancer Research, N. Y.*, January, 1925, i, 67–73.

Even in the advanced cases under discussion the inhibitory effect of radium emanation-implants on the progress of the cancer is unquestionable. The emanation appears to accelerate the breakdown of the tumor cells and also to stimulate connective tissue reaction which produces a limiting sclerosis. The return of bleeding is the clinical evidence that a soft cancerous exophyte has occurred. In advanced cases this usually springs from the base of the crater. The removal of the soft exophyte coupled with adequate needling is often followed by a protective sclerosis or if the exophyte reappears it is hard, sclerotic and less vulnerable. The soft exophyte indicates feeble connective tissue reaction while the hard growth shows a more pronounced reaction.

In some individuals the carcinoma is more susceptible to radiation than in others. The discharge is modified and local comfort improved The hard smooth crater surface resulting from the treatment does not readily harbor bacteria. The topical irradiation must be directed not so much at the degenerating part of the tumor as at the young tumor cells in the bed from which the tumor grows. The exercise of careful judgment and precision in the application of vaginal and transperitoneal needling should aid materially in obtaining better results.

Implants of 0.3 to 0.4 mc. potency per cubic centimeter of tissue are preferred. The intervals between treatments are not less than four to six weeks. The loss of blood does not contraindicate the insertion of emanation capillaries by the vaginal route, particularly when this can be done without the use of a general anesthetic. Needling alone is incomplete without properly coordinated deep roentgen-ray therapy. The procedure if carried out accurately does not subject the patient to any undue risk. An extensive involvement of the anterior vaginal wall and the fear of obtaining a vesico-vaginal fistula should not contraindicate needling. A sclerosed vesico-vaginal connection is preferable to a cancerous deposit. The presence of acute infective inflammation in the pelvis is an absolute contraindication to radiation therapy.

OSGOOD, ALFRED T., and CAMPBELL, M. F. Some of the clinical aspects of cancer of the prostate and bladder. *Arch. Clin. Cancer Research, N. Y.*, January, 1925, i, 59–65.

In early discovery of carcinoma of the prostate lies the only hope of cure or prolongation of life. If a diagnosis can be made early the radical removal of the prostate may be considered, but the risk is perhaps equal to that of the neoplasm itself. It is entirely probable that the patient may live as long without the operation as with it. Radium implantation into the exposed prostate offers greater hope of relief or cure. In a case clinically determined to be cancer of the prostate radium offers the greatest aid at present. The symptoms are relieved in a surprising manner after radium implantation into the tumor mass. The effects, however, are not permanent but they often give relief and prolong life. As a matter of fact, it is doubtful whether any case of cancer of the prostate clinically diagnosed, has ever been cured. Deep roentgen therapy in such cases has been advised by some but its value has not yet been established.

In the case of cancer of the bladder radium has been found to give good results in treatment. The endo-vesical (cystoscopic) application of radium seems less certain than the implantation under direct vision into the bladder. Cystotomy permits palpation of the tumor and offers information as to its extent. By using small doses of radium little tissue necrosis results and the clincial value of this procedure seems equal to that from the massive doses that were formerly the general practice. Deep roentgen therapy of bladder tumors is not on a firm basis as yet. Some cases have been benefited by this method while others have not. Radical resection of the bladder wall where permissible and possible offers the greatest hope of cure at the present time. When the trigone is involved total cystectomy has been suggested by some but no striking results have been obtained by this procedure. Involvement of the ureter mouth may be avoided by transplantation of the ureter opening.

NEW, GORDON B. The treatment of malignant tumors of the pharynx and nasopharynx. *Surg., Gynec. & Obst.*, February, 1925, xl, 177–182.

In the treatment of malignant tumors of the pharynx and nasopharynx the method or

combination of methods best suited to the particular type of growth should be employed. Surgery, cautery, diathermy, radium or roentgen radiation or a combination of these, each has a definite value. It is known that cases in the sarcoma group such as lymphosarcomas are best treated by radium or roentgen radiation rather than by operation and that certain epitheliomas of the pharynx respond more readily to cautery and surgical treatment, while others are better treated by irradiation.

The results of treatment of malignant tumors of the nasopharynx are usually not very good. The tumors are frequently overlooked until they become quite extensive. Because of their location it is difficult to determine their extent accurately and to apply treatment. Finally, the grade of malignancy is usually high and metastasis occurs early. In 65 per cent of the patients examined the glands of the neck were involved. Of 19 patients with fibromas of the nasopharynx, 15 were cured by the use of radium. The epitheliomas and lymphosarcomas of the pharynx are of a very active type of malignancy. In many cases the history is only a matter of a few weeks or months, the glands becoming affected early. Low grade malignancies, however, also occur in this region. Mixed tumors of the pharynx are entirely different from the others. They are of a very low grade, encapsulated type and of long duration. These tumors are usually freely movable and should always be treated surgically, if possible.

Malignant tumors of the pharynx and nasopharynx are usually of a very high grade of malignancy (Grade 3 or 4 on the Broders scale). Discrimination is necessary in the selection of patients with malignant conditions whose tumors are very extensive, as in certain instances the treatment given is detrimental rather than beneficial. Most of the patients treated obtained marked symptomatic relief. Some had their lives prolonged for months and even years, while others are apparently cured. Statistics of the various groups are presented in the form of tables.

SCHMITZ, HENRY. The treatment of tuberculosis of the female genitalia with light and *x*-rays. *Radiology*, April, 1925, iv, 283–287.

Genito-urinary tuberculosis of the female is a localized manifestation of generalized tuberculosis. The therapy includes medical, surgical and actinic treatments.

The actinic treatment consists in daily application of a light bath for one hour from an Edison carbon light diffused by a reflector. The anterior and posterior body surfaces are each exposed for 30 min. This is followed by an application of ultraviolet rays from an air cooled quartz lamp. If the tuberculous exudate or infiltrate does not begin to decrease within four to six weeks, roentgen-ray therapy is added to the ultraviolet ray treatment.

The roentgen rays are applied locally. They must be hard and filtered to produce a homogeneous penetration of the entire diseased area. The dose should be from 5 to 10 per cent of a full skin dose attained at the depth of the disease. The 5 per cent skin erythema dose may be repeated every three weeks, and the 10 per cent dose every six weeks until resolution of the tuberculous process is complete (ordinarily within 4 to 6 months). If under the secondary roentgen-ray treatment the general and local condition has not markedly improved it is concluded that the case is refractory to actinic therapy. The results obtained by this mode of treatment are considered to be good.

SCHREINER, BERNARD F. A summary of the results in the treatment of adenocarcinoma of the fundus of the uterus by radiation. *Arch. Clin. Cancer Research, N. Y.*, January 1925, i, 35–39.

A preliminary summary is given of the results obtained in the treatment of 56 cases of adenocarcinoma of the fundus of the uterus. In the group classified as operable, the treatment consisted in general of the application of 2 or more tubes of radium to cover as nearly as possible the uterine cavity, each tube being left in position for approximately 1000 to 1800 mc-hr., filtered through gold 0.5 mm., brass 0.5 mm., and rubber 1 mm. This was supplemented by high voltage roentgen radiation applied through 2 or more fields so that the dose 3 to 5 cm. from the position of the tubes approximated 135 per cent of the skin erythema dose. The more advanced cases received essentially the same treatment. The preliminary results indicate that cancer of the fundus of the uterus may be clinically healed in about 72 per cent of operable cases. In the inoperable cases the treatment has yielded palliation lasting from six months to three years. The treatment in recurring cases following incomplete operation has yielded a clinical healing in about one-third of the cases.

SCHREINER, BERNARD F. A report of sixteen cases of adenocarcinoma of the cervical canal treated by radium and *x*-rays. *Arch. Clin. Cancer Research, N. Y.*, January, 1925, i, 31–33.

In 537 cases of malignant disease of the cervix, 521 were classified as mucous membrane epitheliomas, and 16 were adenocarcinoma, the ratio being about 33 to 1. The youngest

patient was twenty-seven and the oldest was seventy-three; and the majority of cases treated were between the ages of fifty and seventy.

The treatment consisted of radium filtered through 0.5 mm. gold, 0.5 mm. brass, 1 mm. rubber, inserted in tandem into the cervical canal. These were supplemented at first with radium packs but recently high voltage roentgen rays have been substituted for the pack. The dosage administered is about 135 per cent of the skin erythema dose, 3 to 5 cm. from the tubes in the cervical canal. (The quantity of radium used is not mentioned.)

One case received prophylactic treatment and is reported clinically well for two months. A total of 8 cases, comprising the advanced and late stages of the disease were all unimproved by the treatment. In 7 cases comprising the early or so-called operable cases were included 3 cases that died following palliation for six months, two months, and fifteen months respectively. The remaining 4 cases are reported as clinically well (one case for forty-four months, one for twenty-two months, one for twenty months and the fourth for one month).

SMITH, WILLIAM S. Gynecological conditions treated with radium alone or combined with surgery. *Surg., Gynec. & Obst.*, May, 1925, xl, 598–604.

A report is given upon the results obtained in 66 cases of chronic metritis at menopause, 21 cases of fibroids, 41 of carcinoma of the cervix, 17 of carcinoma of the fundus, and 11 miscellaneous cases. The radium was administered in two tubes, each containing 50 mg. The screening, glass capsule, 1 mm. Pt and 2 mm. rubber tubing, permitted the escape of gamma rays only. The patients as a rule suffered from vomiting and nausea while the radium tubes remained in place, the symptoms subsiding when the tubes were removed. It is believed that these symptoms were due to the presence of the foreign body in the uterus rather than to a specific effect of the radium. There was very little troublesome leucorrhea reported. The dose was 1200 to 2400 mg-hr. Temperature reactions occasionally observed are believed to have been due to a fresh invasion of organisms after the curetting and blocked drainage.

In the treatment of chronic metritis the results have been satisfactory. Uterine bleeding stopped in five or six weeks and the uterus gradually became smaller. The dosage in these cases was 1200 mg-hr. A few cases required a second radium treatment six months later. Eleven of the cases had combined treatment of radium and surgery. The operative procedures were trachelorrhaphy, amputation or repair of the anterior or posterior vaginal walls.

Most of the fibroid tumors treated were small, only 3 cases of the 21 having tumors larger than a fetal head. Care was taken to exclude submucous and pedunculated tumors and those causing pelvic pain. The patients were all subjected to a careful bimanual examination under anesthesia and an intrauterine investigation with a curette before the radium was introduced into the uterus. The usual dose was 1200 mg-hr. The results obtained were excellent. The flow ceased and tumors gradually became reduced in size. Two patients with large fibroids and representing poor surgical risks received 2400 mg-hr. of radium as a preliminary to later supravaginal hysterectomy. The preliminary radium treatment improved their condition sufficiently to permit successful hysterectomy.

Among the 41 cases of carcinoma of the cervix, 3 were of the epidermoid variety and 38 of the squamous cell type; 34 were considered inoperable. One of the cases received radium treatment and in one month the disease had spread very rapidly. Another received radium treatment and two months later was subjected to a total abdominal hysterectomy. Eight received a Byrne cautery operation and radium at the same session with or without subsequent roentgen-ray treatment; 31 received radium alone or with roentgen rays as a palliative. The 31 advanced cases received the radium application within the cervical canal with the tubes in parallel or in inverted T position. They nearly all received second doses of 2400 mg-hr. after an interval of four to six months and many of them received roentgen-ray treatment across the abdomen. (The dosage of roentgen rays is not given.) The author is of the firm opinion that radium treatment either with or without roentgen rays is the best palliative remedy at present available for this condition.

YEOMANS, F. C. Malignant degeneration of papillomata and ulcers of rectum and colon. *Arch. Clin. Cancer Research, N. Y.*, January, 1925, i, 87–89.

All varieties of so-called innocent tumor of the bowel, either single or multiple, are potential cancers and a menace until removed. In the first case described, occurring in a man aged twenty-nine, there was a condition of multiple polyposis existing for three years before undergoing malignant transformation. Accumulating clinical experience tends to show that practically all cases of this type eventually become malignant when allowed to take their natural course. In the second case, occurring in a

woman aged twenty-five, there was a chronic infection of the colon with ulceration and polypoid degeneration of the mucosa. After a time this developed into a typical adenocarcinoma. Cases of chronic ulcerative colitis, even when apparently cured for months or years often relapse suddenly and should remain under observation for long period after clinical cure.

SCHWARZKOPF, E., AND LEVIN, I. The correct measurement of dosage in high voltage *x*-ray therapy. *Arch. Clin. Cancer Research, N. Y.*, January, 1925, i, 75–86.

Unless and until a true biological method of measuring dosage is developed the chief reliance in roentgen therapy is to maintain a wide margin of safety in the technique. The calculated depth dose as presented in Dessauer's charts is not entirely accurate and requires correction. There appears to be no accurate way by which the corrections may be made in each individual case. There appears to be no method of placing any of our measuring devices directly at the point that is to be treated; therefore in order to obtain the depth quotient of dosage the charts must still be used. Consequently a wide margin of safety must be maintained when administering high voltage roentgen-ray therapy in order to obviate chance of injury to vital organs.

The so-called carcinoma or sarcoma dose is probably nonexistent. It is not necessary to deliver the full dose at one sitting. The so-called radical one-dose roentgen therapy of cancer is of very little clinical value. Only a fractional dose should be administered at one sitting, and after the normal tissues have been allowed to recuperate the next treatment is given.

Of the 17 cases of adenocarcinoma of the corpus, 7 were advanced and 10 were fairly early cases. The advanced cases received 2400 mg-hr. of radium within the uterine canal; 4 of these cases had abdominal roentgen treatment. None of this group was operated on; 3 patients had a second 2400 mg-hr. radium treatment six months after the first, and one patient had three such treatments in all. Of the 7 advanced cases, 4 have died, 2 disappeared and one is living eighteen months after the first treatment. It is believed that radium has relieved this group of considerable bleeding and much foul discharge. The 10 early cases with movable uterus and no demonstrable broad ligament induration received 2400 mg-hr. of radium within the uterus. They all were subjected to a hysterectomy from ten days to six weeks after the radium treatment. Eight of the patients are alive and well one to three years after operation. One patient died of general peritonitis a few days after the hysterectomy, and the remaining case shows extension of the disease into the vault of the vagina two years after operation.

The miscellaneous cases receiving radium treatment had old chronic gonorrheal discharge, hyperovarian function, or trachelitis and erosions of the cervix. The patients with chronic discharge received 400 to 600 mg-hr. radium resulting in lessening of the discharge but none of them are entirely cured. Great benefit and no lasting damage to the menstrual period has been obtained with 400 to 600 mg-hr. of radium in 3 young women with hyperovarian function. The cases of chronic trachelitis and erosion of the cervix received 1200 to 2400 mg-hr. of radium against the cervix or in the cervical canal. None of these cases was malignant. The result of the treatment was reduction in size of the cervix and healing of the erosion.

AUDEBERT, M. Pregnancy after treatment with the roentgen ray. *Bull. Soc. d'obst. et de gynéc. de Par.*, 1924, xiii, 159–160.

The effect of the roentgen ray on the ovary is of much practical importance in pregnancy. A case report is given in which it is shown that irradiation with the roentgen ray does not alter in any way the progress of pregnancy. Two series of five treatments were given as follows: irradiations were given both anteriorly and posteriorly in doses of 2 H filtered through 5 mm. aluminum. The pregnancy was normal and the gestation took place without any untoward incident. It is recalled that in the literature, evidence is at hand showing that the roentgen ray does not hinder or destroy the functions of reproduction and that pregnancy will take place readily in spite of irradiations.

BARRINGER, B. S. Radium removal of carcinoma of the bladder. *J. Urol., Balt.*, February, 1925, xiii, 131–147.

A reclassification is made of all cases of the author's series of carcinoma of the bladder into two groups, papillary carcinoma and infiltrating carcinoma. In these groups have been included all cases removed intravesically up to June, 1919, when suprapubic implantation was begun. From that date all intravesical and suprapubic cases are included. In 23 cases of papillary carcinoma of the bladder the carcinoma was removed in 15; in 6 the result has not yet been determined and 2 are dead or dying. Of 61 cases of infiltrating carcinoma of the bladder, 18 are well, 13 are as yet undetermined and 30 are dead or dying.

A large majority of both groups had involvement of the bladder trigone and bladder neck.

In 15 cases of papillary carcinoma, the tumor was removed intravesically in 12 cases and suprapubically in 3. In 18 cases of infiltrating carcinoma the tumor was removed intravesically in 6 cases and suprapubically in 12. The operative mortality of suprapubic implantation of radium in infiltrating carcinoma is less than 2 per cent.

The good results obtained are due to accurate implantation of the radium into the base of the tumor. When the tops of the tumors are not snared off accurate implantation is not readily performed and the results may be unsatisfactory. All cases that have had a definite submucous extension of the tumor have done badly after radium treatment. Tumors which infiltrate the bladder region deeply are at best difficult to cope with and while such tumors can be destroyed the pain caused by the bare tubes has been great.

BOWER, J. O., and CLARK, J. H. Two cases of myeloid leucemia complicated with pregnancy; treated with topical applications of radium. *Am. J. Obst. & Gynec., St. Louis*, February, 1925, ix, 207–228.

From a review of the literature and experience in the 2 cases reported and in other leucemias it is concluded that heavy initial doses of radium are to be preferred to repeated smaller doses. Of equal, if not greater, importance is the early emptying of the uterus in cases complicated by pregnancy.

Fifteen cases reported in the literature are mentioned in brief protocols. The 2 cases reported by the authors occurred in women aged twenty-four and twenty-five years, respectively. The technique of radium application in the first case was as follows: The border of the spleen was outlined in ink and subdivided into 5 cm. squares. Radium, 100 mg., inclosed in brass capsule 1 mm. thick was placed 2 cm. distant from the skin and allowed to remain over each blocked area for two to four hours, until a total of about 4800 mg-hr had been given. A second treatment of about 5400 mg-hr. was given a month later, and third and fourth treatments of 4800 mg-hr. had to be given at 6-week intervals. A last application of 2400 mg-hr., four months after the last treatment showed no effect on the blood picture. The patient went to labor and delivered a male child who did nine hours after delivery. This case went to autopsy and a pathological report is given.

The second patient received 5400 mg-hr. of radium radiation in the first treatment by the technique outlined above. Because of symptoms of bronchopneumonia further radium treatment was deferred, but she died. Autopsy was denied.

The treatment of leucemia by radium emanation is controlled by blood examinations made every two weeks or oftener. Treatment is not repeated if hemoglobin and red cells show an increase and the white cells a decrease in number. When the leucocyte count is lower than 20,000 no application is made. The maternal mortality in cases of myeloid leucemia that have been permitted to go to term or near term is tremendously high. No apparent immediate reason is set forth as to the cause of death. In the above case which went to post-mortem the usual changes were observed, plus pericardial effusion of moderate degree.

BOWING, HARRY H. Significant cellular changes observed in irradiated tissue, especially of cancer of the rectum. *Radiology*, May, 1925, iv, 378–383.

The healing process following radiotherapy in cases of cancer may be divided into two phases: the changes in the parenchymal cell, and the changes in the stroma or supporting matrix. In the first of these when the exposure is destructive, necrosis is the characteristic feature. If the exposure is nondestructive, differentiation occurs in the parenchymal cells and the range of differentiation is evidently an inherited distinctive feature, related to either form or function. The character and amount of reaction noted in the matrix are no doubt dependent on the intensities employed as well as on the susceptibility of the individual; and they are characterized by a combination of ordinary sequences: (1) leucocytic invasion or infiltration; (2) fibroblastic changes with the formation of a very cellular fibrous tissue, and later of a very dense noncellular tissue, and (3) hyaline formation. Eventually, a very degenerative change is indicated by the deposit of calcium. This demonstrates that when the course of the reaction in the supporting matrix is accomplished, degeneration results, and the matrix is no longer of value in the restorative process.

As yet very little has been done to determine the quantity and quality of therapeutic rays necessary to bring about this satisfactory result in arresting neoplastic disease through differentiation rather than through destruction by imitating or simulating the natural defense processes observed in an untreated neoplastic tissue.

These observations were made in a total of 43 cases of cancer of the rectum that were resected at the Mayo Clinic and that received radium alone or in combination with roentgen rays prior to operation. Thirty-seven of the cases were adenocarcinoma, 4 colloid carcinoma and one squamous cell carcinoma, and one was undetermined. Of the 33 patients who were traced after leaving the hospital, 18 are living and 15 are dead. Ten of the 18 patients are living three years after the first application of radium, 2 less than one year and 6 between two and three years. The surgical mortality was too great in the treated series. This may be attributed to post-influenzal infections especially prevalent at the time, and to operations performed too early when the effects of treatment on the tissues were most severe. Most patients were operated on at that time less than two weeks after the first application of radium, two or three treatments having been given. The reaction was therefore at its height. Now a longer interval is allowed.

CARTER, L. J. The newer methods of treating skin diseases. *Canad. M. Ass. J.*, February, 1925, xv, 148–153.

The treatment of dermatoses has in recent years undergone radical changes. Ointments, lotions and plasters have given way largely to methods of employing high frequency currents as in surgical diathermy or electrocoagulation, radiant light or phototherapy, ultraviolet rays, roentgen rays and radium. The roentgen ray is the most successful single treatment for skin diseases, being approached only by radium and ultraviolet rays. Radium is better suited to small circumscribed lesions, while the roentgen ray is preferred where larger areas are to be covered. In many conditions they should be used in conjunction with surgery or surgical diathermy.

Very recently the use of ultraviolet rays has assumed a position of importance. They may be used to treat much larger surfaces than can roentgen rays and in many dermatoses, such as generalized eczemas. Ultraviolet rays will clear up the lesion equally well. In many conditions they should be used as a supplement to roentgen rays or radium, or as a corrective since the ultraviolet rays are considered essentially a tissue stimulant. For instance, in actinomycosis, roentgen or radium radiation is used to inhibit the ray fungus and absorb the inflammatory products, while the ultraviolet ray is used to promote the formation of healthy granulation tissue.

Brief mention is made of skin malignancies, precancerous ulcerations, keratoses, bacterial and parasitic dermatoses and skin diseases resulting from circulatory defects. The results obtained in their treatment with the radiations above described are in general stated to be very satisfactory.

CHRISTIE, ARTHUR C. A comparison of the results of surgical and roentgen-ray treatment of exophthalmic goiter. *Radiology*, June, 1925, iv, 464–469.

The following seems to be a fair statement of what surgery has accomplished in the treatment of exophthalmic goiter since 1912. It has brought about a permanent cure in approximately 60 per cent of the patients operated upon, and marked improvement in an additional 15 to 25 per cent. This has been accomplished with an operative mortality varying from 1 per cent in the best hands, to a very high percentage in less skillful hands, with a probable average among good surgeons the country over of 3.5 to 4 per cent. There is also a certain indeterminate percentage of cases that are inoperable.

Contrary to the opinion expressed by most surgeons that a very large percentage of cases treated by roentgen rays fail to show improvement, it is the experience of roentgenologists that a majority of cases treated do show definite improvement. It is the uniformity and regularity with which such improvement occurs that constitutes the most convincing proof of the benefit of roentgen treatment in this disease. Brief summaries are given of 4 cases which well illustrate the roentgenological experience. The case for roentgen rays may be summarized as follows: The radiation effects a cure in a considerable percentage of cases but just what percentage is still unknown. That this percentage is in all probability as high as that of surgical treatment is the opinion of experienced roentgenologists. This opinion is based upon the uniformity and regularity with which improvement takes place, as well as upon a considerable number of cures already reported by many different workers. Roentgen therapy has the additional advantage of being available in inoperable and postoperative cases. It must be admitted that roentgenologists cannot yet offer convincing statistical proof; but there is sufficient evidence at hand to fully warrant continued use of the method. It is believed that roentgen rays should be used not only in inoperable and postoperative cases but should be given a thorough trial in all cases, and that only those cases should be operated upon that fail to respond to roentgen therapy.

CLARK, A. S. Radium in dermatology. *Am. J. M. Sc., Phila.*, March, 1925, clxix, 355–373.

A general summary is given which places in perspective the applications of radium in the therapy of dermatoses.

Among the hyperkeratoses, clavus and callosities of the feet are so comfortably amenable to treatment by radium that it must be regarded as the method of choice in these lesions. Soft corns are quite permanently cured with one application of a full strength plaque filtered through 0.1 mm. brass and 1 mm. rubber for 40 to 50 minutes. Many verrucous lesions have been cured in one to two hour exposures without a known failure; and for thick, warty lesions extending under the edges and sides of nails no other known method seems to compare with radium treatment for convenience and results. Leucoplakia of the mouth and leucokeratoses of the lips because of the more or less constant irritation to which they are subjected are, as is well known, apt to degenerate into squamous cell lesions. Those of a syphilitic nature are distinctly improved by antisyphilitic measures. In addition to the usual procedures for the treatment of leucoplakia, radium offers the most convenient and safe method of attack for such lesions that show signs of thickening, ulceration or tendency to degeneration. In the superficial type, application of radium for 60 minutes with a filtration of 0.1 mm. brass and 1 mm. rubber usually results in the complete disappearance of the lesion. Where there is a tendency to induration or ulceration, it is necessary to apply for at least 2 hours radium filtered through 0.1 mm. brass and 3½ to 4 mm. rubber.

Seborrheic or senile keratoses occurring particularly in older people who are exposed to wind, sun and weather demand a treatment that is effective and at the same time leaves a good cosmetic result. In such cases radium is perhaps better than any other known type of treatment, except in the early superficial variety which can sometimes be cleared up with resorcin and sulphur.

Of the nevi, the vascular types are much more responsive to radium therapy than are the cellular and pigmented lesions. Port wine marks are more successfully treated by radium than in any other way but the end-results are far less perfect than in the vascular or cavernous types of this lesion. It is more effective in younger individuals, requiring a more careful technique, with irradiation never applied to the point of a real reaction. It is necessary to stop short of a complete removal of the discoloration leaving a faint pinkish color which may disappear largely after a time. Two or at most three applications are required for a given area, the third application occasionally resulting in the formation of large freckles that persist for months or even years.

Keloids and hypertrophied scars are successfully treated by radium in the form of full strength plaques, particularly in young lesions that have not existed more than six months. Old hard fibrous lesions are probably best excised where suitable tissue is at hand for primary suture without deformity. This is to be followed by radium exposures beginning at about the seventh day to prevent a recurrence.

Granulomas have been found to clear up rather promptly after one or two irradiations with radium. In lupus vulgaris radium has been proven to be one of the best means of attack wherever Finsen therapy is not available. It is pointed out that radium is probably not entirely ineffective in cases of lupus erythematosus.

A brief discussion is given of the effects of radium on various types of cancer of the skin.

CLARK, JOHN G. Irradiation treatment of myopathic haemorrhage. (Editorial.) *Surg., Gynec. & Obst.*, June, 1925, xl, 878–880.

Myomectomy in young women yields excellent results, and when this is not feasible the removal of the uterus with conservation of the ovaries reduces climacteric morbidity to a minimum. In the light of our present knowledge, irradiation must without question be subordinated to operative measures and the judge as to its invocation should be the surgeon. Because of the dovetailing of these two therapeutic agents every gynecological and surgical clinic should have radium as a part of its armamentarium. The application of this remedy should be made by the surgeon because its employment is attended with definite surgical risks. On the other hand, roentgen-ray treatment should be supervised directly by the roentgenologist. Neither remedy should be in the hands of the novice.

While the value of irradiation has been established, it yields its best therapeutic results only to the careful diagnostician who takes into account the size and character of the tumor, its symptomatology, the age and nervous stability of the patient, and the associated or coincident pathological conditions. Tumors which have as their chief symptomatic manifestation pressure effects should fall within the surgical domain, whereas in uncomplicated tumors smaller than a four months pregnant uterus

and having as a sole symptom excessive bleeding, irradiation is the method of treatment *par excellence*, provided the patient is beyond her fourth decade, and that the tumor is not of the large submucous type. Myomata in young women fall, as a rule, within the surgical domain, as a myomectomy or partial hysterectomy with preservation of ovarian function is decidedly preferable to irradiation.

In a nervous woman the extirpation of the tumor with conservation of ovarian tissue even in the menopausal years must take precedence over irradiation because of the fact that the climacteric upheaval induced by radiation is a very serious disturbance. The fear of malignant transformation in myoma uteri has been greatly overstressed. A critical analysis of 816 myomatous tumors showed only 25 sarcomas, and of these 12 could in no sense be considered malignant transformations. In more than 1300 hysterectomies, sarcoma subsequently developed in the cervical stump in only one case, and this sequel was cured by two applications of radium.

CRUTCHFIELD, EARL D. The use and abuse of *x*-rays in the treatment of common skin diseases. *N. Orl. M. & S. J.*, January, 1925, lxxvii, 259–263.

As a general rule more than one skin unit should never be administered within the period of a month and only in exceptional cases should more than a total of four units be administered. A point to be remembered in the roentgen-ray therapy of skin conditions is that a suberythema dose may be excited into an erythema dose by an application of irritants or metallic substances (resorcin, beta-naphthol, salicylic acid, arsenic and mercury). It is therefore well to interdict the use of salves and lotions when roentgen radiation is being used. In treating generalized skin conditions it is well to remember that general roentgen irradiation may be followed by malaise, pyrexia, nausea, prostration and leucopenia. It is therefore advisable to divide the body into at least three divisions for treatment on different days to lessen the constitutional effects of the treatment.

The most common skin conditions amenable to roentgen rays fall into the general group classified as dermatosis and eczema. The latter includes all the chronic dermatoses nondescript in character which usually cannot be definitely diagnosed. In conditions where there are exudation and considerable moisture the use of roentgen rays has been found to be of small value. An attempt to treat several score of cases of seborrheic dermatitis with roentgen rays has led to the conclusion that the radiation is of no value in this type of dermatosis. On the other hand, in very resistant cases of infantile eczema the administration of roentgen rays has procured recovery usually within five weeks.

Six cases of recurrent furunculosis have been treated with apparently perfect results. Four cases of recurrent herpes have so far remained cured one to three years after treatment. On the other hand, chronic streptococcus lymphangitis and chronic indolent ulcers have responded less readily and in only about 50 per cent of these cases have the results from roentgen therapy been promising.

Rosacea, rhinophyma, acne varioliformis and carbuncles have proved resistant to roentgen therapy in the author's experience.

MISCELLANEOUS

ARNTZEN, LEIF, AND KREBS, CARL. Investigation into the biological effect of filtered and unfiltered *x*-rays, as measured on peas. *Acta radiol.*, March 20, 1925, iv, 5–31.

Experiments were made on peas, *Pisum sativum*. The source of radiation was a Müller water-cooled tube, operated by a symmetry induction coil. By means of a spectrometer, the shortest wave length was found to be 0.12A. The peas were laid upon a plaster of paris block and the distance of this block from the focus was about 23 cm. Use was made of the Sabouraud-Noiré pastilles as dosimeter; this being the method most commonly in use in Scandinavian countries.

The length of the radicle of the germinated pea was used as the measure of the biological effect of the roentgen rays. In this plant the radicle has a straight perpendicular growth which is readily measured. It was found that there was an absolute stimulatory effect following doses of about $\frac{1}{42}$ S-N. The stimulation could be demonstrated for the first, and in some instances for the second period of twenty-four hours after exposure but after that time it ceased.

A single full exposure produces a stronger biological effect than the same dose administered in the form of "divided doses." The full effect of large inhibitory doses does not make itself apparent until several days after exposure to the roentgen rays. It was found that when the S-N pastille was used to check exposures the biological effect of roentgen rays filtered through 5 mm. Al was only half as great as the

effect of either the unfiltered rays or rays passed through 0.5 mm. Cu plus 1.0 mm. Al. The reason for this discrepancy lies in the discontinuity of absorption by the pastille. It is stated that to the practiced operator the comparison of the pastille with the standard tint is not a matter of much difficulty and may be safely relied upon. The pastille is perfectly serviceable as a means of controlling the regular functioning of the apparatus from one day to another, but as a final standard for measuring the degree of exposure it is of no value at all.

The curve for the iontometer and the one for the peas are practically identical. This means that the biological effect as measured by the growth of the peas on the radicles during 3 × 24 hours is in proportion to the ionization effect as measured on the iontometer, independently of the filtration.

BAGG, H. J. Hereditary visceral abnormalities in the descendants of irradiated mice. *Proc. Soc. Exper. Biol. & Med.*, 1925, xxii, 271–273.

A report was made last year on the occurrence of kidney defects in mice that were six or more generations descended from certain roentgen irradiated animals. The present report gives the results of 1817 autopsies on the descendants of mice with visceral abnormalities, mainly of the urinary system. Preliminary genetic results are also given to show the nature of the inheritance of the abnormalities.

The abnormalities consisted of unequal-sized kidneys, polycystic and hydronephrotic kidneys, congenital absence of one or both kidneys and localized fetal hemorrhages in the viscera. Eye defects also accompanied the kidney abnormalities in certain cases.

Crosses were made between normal and abnormal mice; and the first generation animals were all apparently normal. The second generation animals however showed inheritance of the defects very closely according to the 3 to 1 mendelian ratio. Back-cross matings between first generation females and the abnormal male parent were made. The expected ratio of abnormal to normal animals in these matings is 1 to 1; but the results show that 40 per cent of the back-cross animals were abnormal and 60 per cent apparently normal.

BERG, H. H. On the intimate combination of roentgenoscopy and roentgenography. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 25–31.

The roentgen plate should be taken so as to augment the roentgenoscopic observations and to permit study of finer detail. A desirable procedure is one which permits the instantaneous roentgenographing of a certain area which is undergoing roentgenoscopy without too great interference with the observation. In this way an unnecessary and wasteful use of plates may be avoided.

For this purpose the author suggests what he terms "directed snapshots" taken by means of an arrangement, the plan of which is given in detail. The device is operated by means of a switch, and exposures of 0.1 to 0.2 of a second can be readily taken.

CASPARI, W. Further discussion on the biological basis for the effect of radiation. *Strahlentherapie*, 1924, xviii, 17–36.

A consideration of all the experimental facts known does not justify the stand assumed by Holzknecht and Pordes who deny the existence of a stimulative action by roentgen rays. Primary stimulation and secondary injury as a result of irradiation are not distinctly separable phases. On the contrary they are usually superimposed. The cells receiving the radiation need not be completely destroyed in order to liberate into the body juices active substances. The effect on the cell may take the form of gel formation or perhaps coagulation followed by the liberation of so-called necrohormones.

CHANTRAINE, HEINRICH. An explanation of the varying radiation sensitiveness of the different tissues. *Strahlentherapie*, 1924, xviii, 85–89.

The lethal dose of radiation for a cell is not an adequate measure of its sensitiveness. A better measure is a ratio of the amount of radiation just sufficient to produce an initial injury and the amount causing a lethal effect. If this ratio is unity, as we find it in the case of the egg and spermatozoa, of the bone marrow and white blood cells, then the roentgen sensitiveness is a maximum. Expressed in other words, if a cell or cell group functions normally somewhere near its maximum capacity it will be found that its roentgen sensitiveness is relatively high.

Thus, in the case of the mammal the work of the intestine is carried on practically near its maximum capacity while that of the lung or heart muscle is normally at a very much lower distance from their peak load capacities. The roentgen sensitivenss of the intestine is correspondingly high and that of the muscle, low.

In the case of tumors, it may be stated that the tumor cell is the more roentgen sensitive the nearer its speed of growth is to its maximum growing capacity.

DUNHAM, KENNON, AND SKAVLEM, JOHN H. Applied pathology of pulmonary tuberculosis. *Radiology*, March, 1925, iv, 181–187.

Hilum and peribronchial tuberculosis are terms born of a false conception of the patho-

genesis of pulmonary tuberculosis. This conception supposes that infection occurs during childhood, lies dormant in the bronchial nodes, and in later years when resistance is lost the infection passes backward through the lymph channels to the parenchyma of the lung by way of the peribronchial or perivascular lymphatics. This conception is contrary to the latest knowledge of the anatomy, pathology and roentgenology of pulmonary tuberculosis. In contrast to the above described concept, it is believed that adult and puerile types of pulmonary tuberculosis which are so clearly distinguished by the roentgenogram have a firm foundation in anatomy, pathology and allergy. The infection enters the lung and is carried to the lymphoid tissues. In the child, there is little reaction near the point of inoculation and a great reaction of the regional lymph nodes. In the adult, there is little reaction of the lymph nodes but massive reaction around the infection with extensive exudate. Thus, in the unsensitized child, the reaction to the tubercle bacillus is little like an inflammatory reaction, while in the adult the reaction is a severe inflammatory one, and is seen upon the roentgenogram as a density under the pleura.

GLASSER, OTTO. Considerations upon the significance of the measurement of the absorption coefficient of water and aluminum with hard roentgen rays in practice. *Strablentberapie*, 1924, xviii, 481–482.

The characterization of radiation quality through determination of μwater cannot be relied upon in practice. Also the calculation of deep doses according to the formula of Dessauer-Vierheller (μ_{Al}/μ_{H_2O}) involves too many difficulties to be readily available for roentgenological practice. To determine the percentage of a given quantity of rays that is delivered at a certain depth under definite conditions, it appears that for the present the measurement by means of a small ionization chamber is most useful. It is pointed out that the Dessauer tables of last year are difficult to apply since Glasser and Fricke have found greatly divergent values.

GREBE, L., AND MARTIUS, H. Comparative measurements of the quantity of roentgen rays necessary to produce a skin erythema. *Strablentberapie*, 1924, xviii, 395–409.

An ionization chamber calibrated to Behnken's R unit was used to compare twenty-seven roentgen instruments in fourteen different roentgen laboratories in Germany, and a comparison was made of the values of their customary erythema doses. It was found that the erythema dose varied anywhere from 1120 R to 285 R, a ratio of 3.9 to 1.0, and a general average of 580 R. These large differences make it quite evident that the skin reaction as a basis for dosimetry can be useful only as a standard dose if it is referred to some definite physical unit.

It is suggested that the "average customary erythema dose" be considered to correspond to the quantity of roentgen rays equal to 600 R units.

HELLMER, H. Study on the gastrointestinal mucosa after gastro-enteroanastomosis. *Acta radiol.*, March 20, 1925, iv, 32–43.

An account is given o some observations on mucous membrane formations in the vicinity of gastro-enteroanastomoses. Roentgen examinations were made of 35 patients who had undergone resection with gastroenterostomy or simple gastroenterostomy. In addition, 5 postmortem specimens of such patients were studied. Eleven cases are described in detail and illustrated with roentgenograms or drawings of the specimens. In the pictures the folds of mucous membranes of the stomach and small intestine are seen to have been rearranged to an essential degree in the neighborhood of the anastomosis. The folds in the stomach converge toward the anastomosis and often lie closer together and higher than is usual at the corresponding place in a normal stomach. The folds on the intestinal side show a tendency to collect in greater numbers near the anastomosis than in its surroundings.

On the basis of Forssell's opinion that the folds of the mucous membrane manage by active movements to procure the fine regulation of the passage of food through the alimentary canal, the writer suggests the possibility that the demonstrated mucous membrane formations on either side of the anastomosis are produced by active movements of the mucous membrane. It is further emphasized that these observations may possibly justify the supposition that a high grade spastic condition of the muscularis mucosae in certain cases can produce obstruction to the passage of food through the anastomosis.

HOLTHUSEN, H. The action of roentgen rays from the biological viewpoint. *Stralentberapie*, 1924, xviii, 241–262.

The problem of radiation biology is the study of the consequences of the in ury or stimulation produced by radiation. This is a biological problem that can be advanced only as general biological science advances. It is not an altogether unjustified hope that radiation biology will assist in a closer understanding of the secrets of living matter just as radiation physics

furnishes the key to the investigation of the material phenomena in their most fundamental relations.

The present state of knowledge makes it appear that a photochemical process is most probably at the bottom of the action of radiation. But whether we regard the effect as due to a photochemical or a thermochemical process or as a discharging action of the rays we still do not obtain an insight into the primary effect upon the protoplasm which takes place in the general biological phenomena. Whether stimulative or injur ous effects follow radiation, or whether similar or fundamentally different mechanisms are responsible for them (upon which the varying sensitiveness of the different types of cells depends) none of the various current theories can decide. Not from physical but from chemical and cytophysiological studies do we find justification for the view that at the forefront of the chemical radiation reactions there is present a denaturation of protein with subsequent coagulation.

It is again pointed out that radiation produces an *injury* to the exposed cells. This does not involve a denial of the existence of stimulation of function or growth in the irradiated elements. This view is not at all inconsistent with biological principles.

KEIJSER, S. Roentgen examination of the lung following injection of lipiodol in the bronchi. *Acta radiol.*, March 20, 1924, iv, 58–60.

A report is given of the advantages following the insufflation of lipiodol into the bronchi of bronchiectatic patients. In the 2 cases reported the diagnosis was comparatively doubtful until after the use of the lipiodol. It is pointed out that it is important to anesthetize the larynx and glottis in order to prevent coughing and disturbance during the roentgen observation. About 20 c.c. of lipiodol was run into either the right or the left bronchus and subsequent roentgen examinations disclosed small bronchiectatic areas that definitely established the diagnosis. Serious after-effects from the use of the lipiodol have not been observed.

KOK, FR. Biological experiments on the action of roentgen rays upon carcinoma. IV. *Strablentherapie*, 1924, xviii, 90–109.

It was sought to determine if it is possible to hinder the development of inoculated carcinoma cells by a pre-treatment of the host with roentgen rays. The experiments were made upon white mice, and the Ehrlich strain of inoculable tumor was used. Even though such observations cannot be applied directly to the radiation treatment of human carcinoma, still it is important to establish the possibility of such action, and thereby extend our knowledge of the carcinoma problem.

It was found that prophylactic roentgen treatments of mice are able to lend a certain amount of protection against subsequent inoculation with carcinoma. When the radlation was applied through a small portal, a slight protective effect was observed but the effect was much greater when the field irradiated was larger. The greatest effect produced by local irradiations was obtained with approximately an epilation dose (225 to 250 e). Smaller doses were somewhat effective but doses over 315 e were not.

Irradiations of the whole animal gave the best protection and required only about 10 e. This is equivalent to about 4 per cent of the epilation dose and is remarkable when compared with the 25 to 50 e that are required to produce a degenerative effect upon an already existing mouse carcinoma. Irradiation of the whole animal with screening off of the area in which the tumor is to be inoculated is likewise effective but less so than when the screening is omitted.

There is a certain time after administration of the prophylactic irradiation when the protection against inoculations is most pronounced. In the case of local irradiat ons this protection appears most prominently one day after the treatment. When the whole animal is irradiated the protection appears to be best two days after treatment and in general irradiat ons with the tumor-site screened off, it is best five days after treatment. It follows that the protection conferred by roentgen radiation is not a lasting one and n many such treated animals it was found that successful inoculations could be made months after an irradiation. A study of the phenomena observed makes it clear that the roentgen rays produce some sort of direct effect upon the tumor-site; nevertheless it appears that the indirect effect upon the whole organism is the most significant.

Experiments were made to determine if it was possible to destroy carcinoma cells *in vitro* with doses in excess of those possible to apply in the treatment of human beings. It was found that the complete destruction of the carcinoma cells was not accomplished with 1500 e, since such irrad ated cells could still be successfully inoculated into mice.

KONRICH, F., AND SCHELLER, E. The effect of roentgen rays on the cholesterin content, hydrogen ion concentration, freezing point depression and surface tension of the blood. *Strablentherapie*, 1924, xviii, 263–282.

In studies made upon sick patients it was found that roentgen irradiation hardly altered

the cholesterin content of the blood and blood-serum; there was at most only an indication of a possible decrease. The pH of the blood remained unchanged; the freezing point depression of the blood serum was increased; and the surface tension of the serum remained practically unaltered (at most there was probably an insignificant decrease).

Experiments made upon healthy rabbits showed that roentgen rays do not alter the cholesterin content of the blood. The pH was decreased and the surface tension was diminished. It will be observed that the observations on sick patients and upon healthy rabbits practically agree with respect to the effect on cholesterin and the direction of change in the surface tension. The observations differ as to the hydrogen ion concentration.

Special emphasis is drawn to the fact that the observations recorded were made immediately after irradiation. No information is given as to the probable course of events at different periods after treatment It is altogether possible that important changes in the characters measured can and do take place at delayed periods. This research therefore establishes the facts for a brief period immediately following irradiation.

LORENZ, EGON, AND RAJEWSKY, BORIS. The rôle of scattering upon the effectiveness of radiation as based on the Compton effect. *Strablentherapie*, 1924, xviii, 473–480.

The total amount of energy utilized in an irradiated substance consists of absorbed primary radiation plus scattered radiation; all of which is transformed to electron emission from the atoms. It follows therefore that the effect of roentgen rays is associated with electron emission. Compton and Debye have demonstrated that a beam of primary rays in penetrating a medium gives rise to recoil-electrons and to scattered radiation of longer wave length (softer rays). Substances of low atomic weight possess more free electrons in comparison to those of higher atomic weight, and the Compton effect becomes stronger, the lighter the atomic weight of the scattering body. Thus, with increasing hardness of radiation and decrease in atomic weight the emission of recoil-electrons in comparison to the emission of photo-electrons becomes more and more considerable.

It must be assumed that the biological action of roentgen rays is proportional to the absorbed energy, the coefficient of proportionality varying naturally with the wave length and the biological conditions. A calculation based on the absorption coefficient for water shows that radiation from a 200 kv. (maximum) tube (1.3 mm. Cu plus 1 mm. Al) yields radiation of which a maximum of about 6 per cent is biologically effective. Simple absorption takes up 2.5 per cent and electron emission through scattering, calculated according to the Compton-Debye theory, accounts for the remaining 3.5 per cent. It is pointed out that the Compton effect is more pronounced at higher voltages and that therefore in deep therapy it probably plays an important rôle.

MATONI, HEINZ-HERBERT. The dependence of the biological effect upon the intensity of roentgen rays with uniform dosage. *Strablentherapie*, 1924, xviii, 375–394.

From a practical standpoint it may be stated that aside from such advantages as saving in time and avoidance of clinical reactions in roentgen therapy, it seems that an increase of the intensity of roentgen rays increases their biological effect (total amount of dosage being the same). In so far as the intensity is concerned an irradiation is the more effective the shorter the time of exposure.

This conclusion is based upon a series of experiments made upon the bean, *Vicia faba equina*. Furthermore, studies have shown that this bean in its reaction to roentgen rays is a reliable test object. The degree of injury produced by the radiation is measured by the length of the germinated root and the characteristic appearance of the side rootlets. It is possible to differentiate between quantities of roentgen radiation within 5 per cent.

It was found that a perceptible decrease in biological effect occurred when the irradiation time was increased four times, with corresponding decrease in intensity. This shows that the Bunsen law (intensity $\times$ time = constant) does not hold for the biological action of roentgen rays. This phenomenon holds true for filtered as well as unfiltered rays.

Glocker, Rothacker and Schönleber, working with the same bean have reported an agreement with the Bunsen law but the observations of these authors could not be confirmed in the present investigation.

MILLER, WILLIAM S. Key points in lung structure. *Radiology*, March, 1925, iv, 173–177.

A detailed description is given of pulmonary structure of the human lung from the anatomic standpoint. The article does not lend itself to further abstracting.

MÜHLMANN, E. Cases of roentgen injury of the mammary gland and lung. *Strablentherapie*, 1924, xviii, 451–456.

The first case occurred in a girl aged twelve, suffering from a tumor of the right pleural region. This was treated by roentgen radiation;

and the tumor was caused to disappear. An examination two and one-half years later showed induration of the interlobular connective tissue of the lung on the right side. It was also found that although the left mammary gland showed normal development for the child's age, the right breast showed no development.

The second case occurred in a woman thirty-two years old, with a tumor growth in the right lung field. She received five doses of roentgen radiation over a period of five months. The patient recovered from her symptoms but the typical effects upon the thorax were evident. There was definite narrowing of the right lung field and contraction of the heart to the right. The markings on the lung became more definite. In this case, however, there was no difference noticeable between the right and left mammary glands.

NAGAI, YASU. The influence of radioactive preparations on the digestion of casein by trypsin. *Strablentherapie*, 1924, xviii, 212–219.

Experiments were made on the pancreatin digestion of casein under the influence of radiothorium and of thorium x. In some of the experiments the quantity of radiating substance was far in excess of that used in therapy. So far as could be observed, the radioactive material appeared to have no effect upon the course of the digestion.

NEUMANN, ALFRED. The effect of roentgen rays upon leucocytes *in vitro*. *Strablentherapie*, 1924, xviii, 74–84.

It is obviously not an easy matter to determine the effect of roentgen rays upon the leucocytes *in vivo* because of the participation of the bone marrow and other organs. It is therefore necessary to make *in vitro* experiments in order to get an idea as to the nature of these effects. Naturally, such *in vitro* experiments must be carefully performed and interpreted if they are to mean anything. Experiments were made upon the bloods of 15 individuals, sick or normal, of various ages. The citrated blood was exposed to 60 H for an hour, 3 ma., from a Coolidge tube 24 cm. distant and filtered through 3 mm. Al. The blood was kept at body temperature and suitable controls were always carried out.

It was found that usually no differences could be discerned between irradiated and non-irradiated leucocytes of the same blood *in vitro*. In 3 bloods positive reactions were noted, namely (1) increased breakdown, (2) unusual fragility, and (3) possibly other effects such as increased tendency to vital staining. The reason why these reactions take place is as yet obscure and requires more precise investigation.

POOS, FRITZ. The behavior of the bloodless organism to roentgen rays. *Strablentherapie*, 1924, xviii, 369–374.

The frog offers an opportunity for determining experimentally the effect of roentgen radiation in the practically complete absence of blood. According to the Cohnheim technique the frog can be exsanguinated and Ringer's solution substituted. Under suitable technique, the perfusing fluid is found to contain a minimal number of blood cells.

Microscopic and macroscopic observations upon the various organs of normal and bloodless frogs showed that the total effect of radiation is very much less when the blood is absent.

SANDERS, ARTHUR. Regarding roentgen injuries of the intestine. *Strablentherapie*, 1924, xviii, 457–472.

Two factors are of importance in the production of roentgen injuries: (1) the quantity of absorbed radiation (over-dosing, ray-overlapping and production of secondary rays all lead to injury), and (2) the specific reactivity of the cell which is high in the intestinal tract and in many cases actually increased, which in itself represents a disposition to injury. Those cases of intestinal injury hiterto described show various aspects of mild enteritis up to severest burns. A report is given of a delayed injury of the intestine occurring half a year after irradiation (with normal dosage) and appearing under the form of chronic ileus. The tissue was carefully examined histologically. Macroscopically there appeared two extensive stenoses and penetrating necroses of the intestinal wall. The microscopic examination of the histologic preparations showed degenerative and reparative processes. The main degenerative changes were found in the vessels which showed endarteritis and endophlebitis obliterans. The glandular epithelium showed general nuclear breakdown. These alterations could also be seen in the macroscopically unaltered portions. There was also some damage to the nervous elements. The reparative processes were characterized by a general chronic inflammation with an especially pronounced connective tissue proliferation in the submucosa. Active formation of new vessels was observed in the muscularis propria and the submucosa.

Cytologically there was observed a striking profusion of plasma cells and fibroblasts showing active mitosis. The new facts brought out by this study are the high sensitiveness of the glandular epithelium to roentgen rays and the fact that there are blood vessel injuries in

portions of the intestine that appear normal macroscopically.

SCHMITT, WALTHER. Is there a possibility of injury to the offspring as a result of irradiation of the ovary prior to fertilization? *Strahlentherapie*, 1924, xviii, 410–443.

A critical review is presented of 30 cases reported in the literature and 6 cases observed by the author. All of these had been irradiated prior to fertilization and in all cases the children born were perfectly normally developed. A review is also presented of 47 pregnancies reported by 17 authors in which similar results were observed.

It is therefore concluded that up to the present not a single case is known of malformation of offspring as a result of irradiation of the ovaries in the mother prior to fertilization. Moreover not a single case is known of such an offspring showing developmental disturbances in later years. Unfortunately, more observations are needed upon this latter point to establish it more firmly because, as a general rule, such children have not been observed frequently enough or long enough.

There is no objection on this score to the practice of roentgen sterilization in women as a therapeutic measure.

SCHWARZ, GOTTWALD. On the roentgen reaction of the skin. Reversion and roentgen allergy. *Strahlentherapie*, 1924, xviii, 483–485.

Experiments were made with partial doses of a little above the threshold value. These averaged 0.5 to 0.75 of the Wintz skin unit dose and were capable of producing a primary erythema. In one series of experiments, two such equal doses were administered in immediate succession and there resulted the typical primary erythema. In the second series of experiments two equal doses were applied but the second dose was delayed 2, 6, or 24 hours. In this last series the second partial dose was applied to the skin already showing a hyperemia resulting from the first dose. The interesting fact was discovered that the total effect in this second series upon the skin was much milder than in the first series.

Several explanations are possible. It seems probable that the first irradiation may have caused an inhibition of the anabolic cell activity characterized by a decrease in roentgen sensitiveness. It is suggested that analogous to the term allergy as used by von Pirquet there is a condition of roentgen allergy of the skin. This latter condition is found in the first stage of erythema and is characterized by a decrease in roentgen sensitiveness. This allergy is not to be considered an "acclimatization."

It is pointed out that the effects observed after successive irradiations of the normal skin are not directly transferable to irradiated malignant tumors whose structure and breakdown are entirely different from normal tissue.

SIEVERT, ROLF M. Some studies on devices for protection against roentgen rays. *Acta radiol.*, March 20, 1925, iv, 61–75.

The radiation escaping through protective arrangements was measured by means of an ionization instrument. The apparatus studied were the following: (1) lay-out for roentgenography according to Forssell; (2) Forssell's lay-out for roentgenoscopy; (3) Albers-Schönberg diagnostic table; (4) Forssell's trochoscope table; (5) Potter-Bucky diagnostic table. Plans of the different arrangements are given and the amounts of escaping radiation are recorded for different distances and angles from the instrument.

It is assumed that in a year a roentgenologist will probably be exposed to a maximum per year of 25 hours in roentgenography, 500 hours in roentgenoscopy, and 1500 hours in roentgen therapy. It appears that even under modern conditions of deep therapy a protection of 3 to 4 mm. of lead or 30 to 40 mm. lead glass is sufficient to protect against direct rays. It is pointed out that the walls, floor and ceiling of the roentgen room give off secondary radiations that play a much greater rôle than is generally believed. It is recommended that the protective walls extend from the floor to the ceiling, and if possible to keep the roentgen tube 2 to 3 meters from the walls. If the floor does not happen to be covered with protective material, special protection should be placed along the strip where the wall meets the floor. It is of advantage to extend the protective wall coating 5 to 10 cm. below the level of the floor, otherwise a protective strip 30 to 50 cm. wide should be laid on the floor on both sides of the wall.

SIPPEL, PAUL. The stimulative effect of roentgen rays in gynecology and its therapeutic application. *Strahlentherapie*, 1924, xviii, 110–136.

Experience has shown that despite arguments to the contrary there exists a real stimulating effect of roentgen rays which is of especial interest and applicability to treatment of the ovaries in amenorrhea and oligomenorrhea. The irradiation is followed by hyperemia and activation of the internal genital organs, sometimes resulting in rather alarming hemorrhages a few hours or days after the treatment. In some cases it was even necessary to resort to extirpation of the uterus in order to control the

excessive blood loss. Similar stimulation has been observed in nurses working in roentgen laboratories. Continual presence in the laboratory, and exposure to scattered and secondary radiations produce their additive effect and end sometimes in very severe hemorrhages.

There is no specified dose for the stimulation of ovarian function in all cases. This must be carefully determined from the condition of the patient. In general, the dose should not exceed $\frac{1}{10}$ to $\frac{1}{3}$ of a unit dose upon the skin, applied to a single large field of the abdomen and the sacrum according to the diameter of the patient. Such a dose corresponds to 3 to 10 per cent at the ovaries (lying on an average 10 cm. below the surface). The irradiations must be administered with exact centering of the tube over the internal genital organs, and with tubes carefully standardized both physically and biologically. At no time should the effective irradiation at the ovaries exceed 10 per cent, and it is advisable to administer the dose fractionally. The technique employed was skin focal distance 30 cm., 200 kv., 40 cm. spark gap, 0.8 mm. Cu plus 0.5 mm. Al, field 18 × 24 cm., abdominally and sacrally, dose 3 to 10 per cent. Such stimulative treatments were administered to 36 women and girls with such difficult conditions as hypovarism, obesity, sterility and hypofunction. These cases are briefly cited. In these there occurred 11 cures and 7 improvements; the therapy was unsuccessful in 5 cases. The remainder were lost track of or not sufficiently observed. Tuberculosis of the mesentery, the genital adnexa and endometrium was also found to yield to roentgen treatment. The technique for irradiation of peritoneal tuberculosis and of tuberculous affections of the internal genital organs is the same as that described above for the ovaries. The rays are applied through two large fields upon the affected portions. The dose is one-half to two-thirds of a unit dose upon the skin, which is equivalent to 30 to 40 per cent in the center of the abdomen. In special cases lateral fields are also made use of. Brief reports are given of 17 cases thus treated which resulted in 10 cures and 3 improvements. One patient was lost sight of and 3 died of generalized tuberculosis. In addition there were 2 cases, one of tuberculosis of the bladder and one of tuberculosis of the basal phalanx of the thumb which recovered after roentgen treatment.

Experience up to the present has demonstrated that it is impossible to secure any measure of recovery from carcinoma of the uterus through the application of stimulative doses of roentgen rays with the administration locally of lethal direct irradiations.

In the irradiation of the thyroid for the control of uterine hemorrhage in a woman of sexual age, a successful result can be expected only when the hemorrhages are due predominantly to disturbance in function of the enlarged organ and there is present a normal genital system with normal ovarian function. Irradiation of the spleen was given in 17 cases of uterine hemorrhage in puberty, hemorrhagic diathesis, retroflexi uteri and adnexal diseases occurring during youth. These cases are briefly cited. The rays were administered laterally through a field 10 × 12 cm., 200 kv., 40 cm. spark gap, vacuum tube, 0.8 mm. Cu plus 0.5 mm. Al, skin focal distance 30 cm., dose one-fourth to two-thirds unit dose (equivalent to 10 to 40 per cent) in the region of the spleen. The results were not very encouraging, and in general were unsuccessful. Attempts to control genital hemorrhages by irradiations of the bone marrow were similarly unsuccessful.

STARK, ERNST. Secondary injury in roentgen therapy. *Strahlentherapie*, 1924, xviii, 153.

A deferred roentgen injury never occurs without an antecedent primary injury. Every injury that appears in an irradiated area sometime after a treatment is the result of a new acute or of a chronic irritation of some sort exerting its effect upon tissue made hypersensitive by the radiation. Because of the fact that in certain cases the necessary therapeutic effect can be produced only with a concurrent production of roentgen scar, it becomes clear that the roentgen therapist has necessarily laid the basis for a possible future ulceration in the affected area. This, however, should be considered a concomitant of present methods of treatment and should be kept distinct from injuries caused by negligence and carelessness. Such exposed areas should naturally be protected from all sorts of irritation so far as possible. If, however, the secondary injury arises through subsequent irritation, a conservative treatment is considered better than surgical. It is, however, recognized that a prompt surgical intervention, as for instance in intestinal stenosis, may be vital.

STRAUSS, OTTO, AND ROTHER, JULIUS. The effect of radiation upon the vegetative system. *Strahlentherapie*, 1924, xviii, 37–63.

In the experiment animal, roentgen irradiation causes a drop in the blood pressure which is participated in to a large extent by the parasympathetics. It is as yet uncertain whether the relation is direct or indirect. This effect upon the blood pressure may be eliminated by the administration of atropin.

The blood sugar content is also influenced by roentgen irradiation; but the effect depends a great deal upon the species of animal. In the case of the rabbit, all experiments have shown a considerable increase in blood sugar content as a result of irradiation. The effect appears to be analogous to that following traumatic or mechanical insult. In the dog, on the other hand, the effect on the blood sugar content is relatively insignificant. In the human being, there occurs a decrease in the blood sugar content immediately after irradiation and after twenty-four hours there is a compensating increase.

The effect of insulin and adrenalin upon the blood sugar content of the human being was studied. It was found in individuals irradiated over the abdomen that the effect of insulin on the blood sugar was increased while that of adrenalin was decreased. Isolated irradiations of organs of the upper abdominal region show a remarkable effect upon the blood sugar. In the rabbit, irradiation of the pancreas and the liver causes an increase in the blood sugar and this is also observed in the dog. It is also observed in the dog that irradiation following a complete extirpation of the pancreas occasioned a still further increase in the blood sugar.

Irradiation of the isolated adrenals causes a drop in the blood sugar level which becomes apparent after several days. A special technique has been devised for irradiation of the adrenal so as to permit an accurate interpretation of the action of the radiation; and it appears, as a consequence, that the common belief that the adrenals are excessively sensitive to radiation is not as yet definitely established.

Irradiations after section of the splachnics has not as yet yielded results that permit definite conclusions. It was found that isolated irradiations of the skin of the human being do not apparently influence the blood sugar level. In abdominal irradiations the effect upon the vegetative system appears to be indirect and not a direct one.

THEDERING, FR. Roentgen treatment with very small doses. *Strablentherapie*, 1924, xviii, 444–450.

The curvative effect of very small doses of roentgen rays has been observed frequently in dermatoses such as alopecia areata, acne, skin tuberculosis and superficial new growths. The author reports several cases of complete alopecia which received a roentgen dose of 0.5 to 1.0 X (10 X = 5 H = B Sabouraud) applied twice within a month over four fields of the scalp, filtered through 0.5 mm. Al. A superficial rodent ulcer is reported to have been completely cured following three treatments with 1 X through 0.5 mm. Al. Certain forms of skin tuberculosis likewise appear to yield to this form of roentgen therapy. These clinical observations, extending over an experience of ten years, furnish evidence of what may be called the stimulative effect of roentgen rays.

APPELRATH. Increase of the skin sensitiveness to roentgen rays in encephalitis lethargica. *Strablentherapie*, 1924, xviii, 593–594.

The tolerance of the skin to roentgen rays except in inflammatory diseases of the skin is considerably reduced in certain general diseases. In the case of Basedow's disease a 25 per cent increase in sensitiveness has been reported. Observations made by the author in the late form of epidemic encephalitis indicate that a similar increase in skin sensitiveness to roentgen rays is to be found.

In order to control the excessive salivation occurring in this disease an application of ⅔ to ¾ skin unit dose was applied at a distance of 23 cm. from a Coolidge tube operating at 2 ma., 40 cm. spark gap. An early erythema appeared in several hours and ended in a brown pigmentation in from four to six weeks. This was checked by control irradiations of an area on the chest in order to exclude a possible increased sensitiveness of the skin of the face. Control irradiations with the same dose upon 3 individuals not suffering from encephalitis served to demonstrate that the observed hypersensitiveness to roentgen radiation is a real phenomenon in epidemic encephalitis.

BERTHOLD, R. The photographic and ionizing effect of roentgen rays of different wave length. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 100–103.

A careful determination was made of the ratio of darkening of photographic plates to ionization produced by various wave lengths under conditions where the total energy of radiation was kept constant. The basis for the calculation was the assumption of the value of unity for the ratio of blackening to ionization of the silver Kα radiation. These values were also calculated upon the basis of equal absorbed energy. For this purpose, the absorbed energies in the Holthusen chamber and in the photographic film were calculated and the ratio of the energy absorbed in the chamber to that in the plate was determined. These ratios were plotted as a function not of the wave length but, more logically, of the frequency. The resulting curve was striking in that it showed a decrease in the ratio of photographic to ionizing action with increasing frequency. Although this linear variation is relatively unimportant

practically, it raises important theoretical considerations.

The results of this research point again to the urgency of discovering just which of the physical phenomena is paralleled by the biological effect of roentgen rays. Is it to be ascribed to the ionizing action, to the photo-chemical action, or to the heat effect? It is clear that an answer to this question is necessary before dosimetry can be established upon a rational basis.

BOWES, PHYLLIS K. Notes on *x*-ray protection. *Brit. J. Radiol.*, March, 1925, xxx, 90–95.

With standard Coolidge tube operating at 80, 100 and 120 kv. the amount of radiation penetrating different thicknesses of lead was measured by means of an ionization chamber, with and without an aluminum screen. With the aluminum screen absorbing some of the soft rays the values for absorption by the thinnest sheets of lead were somewhat too low. When measurements were made without the aluminum screen, secondary radiations were produced by the thicker sheets of lead which before were absorbed by the aluminum screen. Considering the figures for 100 kv. and 2 mm. lead, which is the thickness of lead advised for protection at and below this voltage, the ionization found without aluminum screening is more than three times as great as with aluminum screening. This difference is shown to be due to radiation from the lead itself. The results show that it is advisable to have some covering over lead used for protective boxes—a thin sheet of paper is quite suitable. To make a screen safe and yet not unsightly the lead side may be kept towards the operator but should be covered with paper or some other suitable material. The results also show that the protection of lead rubber gloves is greatest if the linings are kept absolutely clean.

BOLAFFIO, M. The calculation of depth intensities. *Strablentherapie*, 1924, xviii, 595–604.

The following formula is derived for the calculation of depth intensities to roentgen radiation:

$$I_n = I_o \frac{d^2}{d_n^2}\left(1 - \frac{1}{x}\right)^n$$

where I_n is the intensity at n centimeters below the surface, I_o the 100 per cent depth dose, d and d_n the respective distances of surface and bottom of the water layer from the focus, and $\left(1 - \frac{1}{x}\right)$ the absorption factor as determined by measurement. Tables are presented to show the agreement between the results obtained by applying this formula and those secured by iontoquantimetric measurements. It is observed that the values obtained by actual measurement with the iontoquantimeter are somewhat higher than those obtained by applying the above formula. It is pointed out that in actual practice it has been observed that the biological action of deep roentgen rays is less than the quantimetric measurements would indicate. There appears to be a good agreement between the curve obtained by calculation as above and the "biological growth," that is, there is agreement between the biological and calculated values but not with the iontometric ones.

COLE, H. N. Chronic roentgen-ray dermatoses as seen in the professional man. *J. Am. M. Ass.*, March 21, 1925, lxxxiv, 865–874.

Chronic roentgen-ray dermatoses are those characteristic skin changes seen especially on the uncovered parts of workers exposed without protection to the action of the roentgen rays. In the beginning the subjective symptoms are *nil*, but later as the process advances the patient complains of dry hands which have lost their sense of touch and temperature. The gripping power is weakened. In advanced cases there is much pain especially at night and of such degree as to prevent sleep. This pain is probably due to involvement of the nerves in contracted scars and ulcers and perhaps also to stoppage of nerves caught in the contracting tissues.

The dermatosis is a degenerative process due to sclerosis of the blood vessels supplying the corium, with resultant loss of nourishment and of resistance or balance on the part of the upper corium. There then ensues an increased proliferation of the epidermis into the corium in its search for nourishment. It finally becomes parasitic, assumes wild growth and the epidermoid carcinoma results.

These dermatoses in physicians and technicians are probably more numerous than the literature would lead one to believe; probably many severe cases have never been reported. A series of 9 cases is reported, in 6 of which a clinical diagnosis of malignant degeneration was made and was confirmed microscopically in the 3 patients who permitted microscopic examination. A microscopic study of tissues from selected roentgen-ray dermatosis shows that it is a degenerative change resulting from sclerosis of the vessels supplying the skin, with disappearance of the glandular elements of the corium. The corium is much thickened

from the formation of a degenerated hyaline collagenous-like material; and new formed capillaries (telangiectasis) appear in an attempt to replace the lost blood supply of the corium.

The treatment of chronic roentgen-ray and radium dermatoses consists in the use of quartz lamp therapy, carbon dioxide snow, electrocoagulation, surgery and sometimes radium and roentgen-ray treatment. It is quite successful if not too much damage has been done and if instituted early. The best treatment, however, is prophylaxis. It is urged that the safety measures recommended by the American Roentgen Ray Society and the Royal College of Physicians be universally adopted.

DEMPSTER, J. H. The teaching of radiology to undergraduates. *Radiology*, April, 1925, iv, 325–326.

The object of undergraduate teaching is not to make specialists in roentgenology but to give some understanding of the scope and limitation of roentgen rays as diagnostic agents and of both roentgen rays and radium as therapeutic measures.

A portion of the time available should be devoted to the history of roentgenology including the period before the discovery of roentgen rays. A correlation of the special work of Roentgen and the later work of Moseley, Darwin, Laue, and Bragg with that of the physicists before Roentgen's time is interesting and useful. The student, who is already expected to have a certain knowledge of physics, should be taught the importance of protection both to patient and to operator from the roentgen rays and radium. The medico-legal aspect of roentgenology should be carefully gone over. The subject of medical ethics as it relates to roentgen-ray work is another point that should be covered. The study of anatomy from the roentgen-ray viewpoint is of course a prime essential. This includes special emphasis on the fact that roentgenography is a study of the density of the structures examined. Instruction should be as far as possible by means of illustration. A single illustration gives a more accurate idea than any purely verbal description can possibly do.

The more advanced students may be divided into convenient groups for more intensive instruction in roentgenographic interpretation which should be given in the regular routine of the hospital where the students receive their clinical instruction. The correlation of roentgen-ray findings should be made with other clinical data in working up case histories. Last, but not least is instruction in that branch of therapeutics which employs radium and roentgen rays.

DUKE, W. W. Light sensitiveness. *Radiology*, April, 1925, iv, 279–282.

Attention is directed to the fact that there are persons who respond by an allergic reaction to certain light rays at the violet end of the solar spectrum. It is suggested that this phenomenon might have a bearing upon the origin of roentgen-ray burns. Since there exist patients who are hypersensitive to the action of visible light or ultraviolet light, it may be that there also exist individuals who are hypersensitive to the action of ordinarily innocuous doses of roentgen rays.

ENGELMANN, W. The radioactivity of curative springs in German countries and its participation in the therapeutic effect. *Strahlentherapie*, 1924, xviii, 686–709.

A compilation is given of various reports as to the readioactivity of certain curative springs. The original must be consulted for details.

As was to be expected the radioactivity was found to vary between wide limits. In some of the baths the radioactivity of the water undoubtedly played an important rôle in the therapeutic result, while in others this was probably a minor one. In the designation of radioactive springs it is important to determine the intensity of the radioactivity.

From present knowledge it would appear that springs yielding water containing 1000 Mache units per liter are sufficiently strong to be used as "drink cures." The water in radioactive baths should contain at least 30 to 50 Mache units per liter. The therapeutic effect of radioactive water is merely one aspect of the general field of balneology, and the precise effects require further research for their elucidation.

FRANKE, HEINRICH. Considerations respecting the photographic bases of the roentgen picture. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 117–123.

The successful results by American roentgenologists in obtaining roentgenograms by brief exposures are due largely to the advantages in speed of their photographic accessories. The views of Goldberg upon the structure of the photographic picture are carried over to the roentgenogram. Consideration of the details of high lights and of sharpness shows the necessity of securing an increased definition when contrasts are of a low order. It is shown that beyond certain contrasts no important increase of detail is obtainable, but rather a loss occurs; and that pictures considered to be faint are able to reproduce the greater part of the detail, which explains the astonishing usefulness of

relatively poorly exposed pictures obtained with hard rays.

The fundamental difference between photographic reproduction and roentgenographing lies in the fact that the former must adjust the photographic material to the picture, whereas the latter through a choice of tube potential can adjust the brightness of the object to the photographic material. The avoidance of scattered radiation in roentgenographing with double films finds its explanation in the correct timing of the developing process. One should not place too much reliance even upon the best double films since they are unable to do more than their gradation and the laws of absorption will permit them. Beyond a certain ray hardness even these lose the characteristics of a roentgenogram taken apparently with a soft tube.

FRANKE, H. The fundamental importance of a sharply defining tube for each potential. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 111–116.

In order to obtain a reliable roentgenogram, a focus of very limited area is indispensable. The belief that a broad focus suffices or is indeed indispensable for the taking of rapid exposures at high voltage is based upon a false conception. The Potter-Bucky diaphragm through the increased distance of the film from the object demands, contrary to widespread belief, the application of a sharply defining roentgen tube. The results obtained with this screen using a tube of wide focus can indeed yield pictures with great contrast but they are not sharp. There is a pseudosharpness of roentgen pictures which can be observed especially when employing annular focuses. The picture resulting appears to be completely satisfactory but the true structure of the object is not reproduced.

A method is described for obtaining visually an idea of the character of the focus of a tube.

HADEN, RUSSELL L. The radiographic diagnosis of periapical dental infection in the light of bacteriologic findings. *Radiology*, April, 1925, iv, 337–341.

The roentgenographic criteria of infection to be dependable must be a means of determining presence or absence of bacteria in a suspected area. The question is therefore how far can one translate roentgenographic evidence of infection in terms of bacteria? Does the absence of roentgenographic evidence of infection rule out the presence of bacteria? The problem is a bacteriological one and the author has endeavored by cultures of pulpless teeth to obtain further facts concerning periapical dental infection.

By means of careful surgical technique a series of incisors, cuspids and bicuspids were extracted and cultured. The different steps in the technique were checked repeatedly to detect possible errors. Molars were not examined because of the difficulty of avoiding mouth contamination. Cultures were made of 1307 teeth. From this total are excluded those specimens in which there was a suspicion of contamination by saliva, lips, or tongue, and all the teeth showing pyorrhea. The above number were fairly equally divided between vital teeth, pulpless teeth with negative roentgenogram and pulpless teeth with positive roentgenogram.

The results show that there is a sharp limitation to the translation of roentgenographic evidence of infection to actual infection, that is the actual presence of bacteria. The percentage of positive cultures in teeth which showed roentgenographic evidence of infection was so high that such evidence was sufficient to warrant radical measures. However, the absence of roentgenographic evidence of infection should never be taken as sufficient evidence to exclude the presence of an active dental infection. In such cases the status of the patient must be considered and the question of the presence and severity of lesions of focal origin must be taken into consideration.

Of 392 vital teeth, 9 per cent showed from one to ten colonies; 5 per cent ten or more colonies, and only 1 per cent over 100 colonies. Of 490 pulpless teeth roentgenographically negative, 10 per cent showed from one to ten colonies, 44 per cent had ten or more, and 24 per cent had over 100 colonies. Of 425 pulpless teeth with positive roentgenogram 10 per cent showed over one to ten colonies, 60 per cent, ten or more colonies and 44 per cent had over 100 colonies. The incidence of infection was almost as high in the roentgenographically negative as in the roentgenographically negative group.

The changes which from the roentgenographic standpoint are usually considered indicative of infection are all in fact evidence of the body resistance to the infection. In many cases the roentgenographically negative tooth is a far greater source of systemic infection than the roentgenographically positive tooth since in the former there may be little resistance to the infection.

HARRIS, M. L. Chronic laryngotracheitis following roentgen-ray therapy of neck. *J. Am. M. Ass.*, April 25, 1925, lxxxiv, 1268.

A case is reported in a woman aged forty who had been suffering from hyperthyroidism

for the past seven years. She had been treated medically and improved somewhat in the first and second years, and with a recurrence of the condition she received her first roentgen-ray treatment two years later. She received in all twelve irradiations during a period of eighteen months, the hyperthyroid symptoms becoming improved. After the sixth treatment which was given about seven months after the first, she began to suffer intermittent attacks of hoarseness. For the past year she had had attacks of dyspnea with a feeling of suffocation followed by coughing and expectoration of blood-tinged mucus and small hard masses—apparently bronchial casts.

The lower part of the neck and the upper part of the sternum showed marked telangiectasis and slight bulging of the manubrium. No thyroid enlargement was apparent. The throat was markedly congested and the vocal cords moved with phonation and were thickened, lusterless and relaxed. There was an area of granulation tissue about 3 mm. in diameter in the left main bronchus. The tracheal mucosa looked dry and the secretion was thick and scanty. There was no narrowing from outside pressure. It is clear that atrophic laryngotracheitis should be added to the list of possible sequelae to roentgen-ray therapy of the neck. This condition is distressing but not directly fatal. The patient died suddenly after an attack of dyspnea from an unknown cause.

HAZAMA, F. The pharmacology of respiration. v. The effect of gamma rays on cell respiration. *Ztschr. f. physiol. Chem.*, 1924, cxxxviii, 102–107.

Erythrocytes (of the goose) suspended in Ringer's solution were irradiated with gamma rays from radium bromide capsules, and the change in respiration (oxygen consumption) was measured in the Barcroft apparatus. It was found that gamma rays in small doses were able to accelerate temporarily the oxygen consumption of the goose erythrocytes. This was not an invariable finding, but occurred in the majority of experiments. Larger doses of the rays had no demonstrable effect on the rate of respiration.

HERFARTH, HEINRICH. Change in epiphyseal structure in contracture of the knee. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 54–59.

Observations are reported upon the changes found in growing individuals suffering from ankylosis or contracture of the knee in tuberculosis and in osteomyelitis. These presented the most diverse stages of development of this deformation, showing the alterations in the epiphysis, in the bones of the joint, early and late in the development. The roentgenological changes of the growing epiphysis are explained as an adaptation to new function and to the new static conditions. This indicates that dynamic conditions such as pressure of weight and tension of ligaments and muscles in the vicinity of a joint may have something to do with the development of the deformation. The roentgen pictures of the femur and tibia showed a functional adaptation of both epiphyses to their altered relative position. The main change consists in a gradual development of a truncated pyramidal projection of the tibia with a corresponding one in the femur.

HOLFELDER, HANS. Can a further increase in output of roentgen apparatus still be of utility when the secondary current intensity is considered in relation to medical deep therapy or roentgen diagnosis? *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 76–79.

The author believes that there is little prospect through further increase of ray output to accomplish any further noteworthy progress in deep therapy and its results. The slight differences in radiation output that exist between the various modern roentgen machines are considered of absolutely insignificant importance to the therapeutic outcome. On the contrary, the deciding factor is the behavior of the tumor itself, the experience of the roentgen operator and the present status of our biological knowledge.

Attention is directed to the fact that ordinarily the high power roentgen diagnostic apparatus may not be furnished with a sufficiently constant source of current to permit it to operate at its rated capacity. Moreover the ability of the roentgen tube to operate uniformly at these high powers is often overestimated. It has frequently been observed that the cables carrying the current to the high power apparatus are inadequate for their purpose. The development of the art of roentgenography with present available apparatus still demands a good deal of research and practice. Further increases in the power of diagnostic roentgen apparatus do not appear to promise very much that is valuable.

KEILLER, VIOLET H. Cartilaginous tumors of bone. *Surg., Gynec. & Obst.*, April, 1925, xl, 510–521.

Case reports are given of the following conditions: Excessive cartilage formation in callus; subperiosteal epiphyseal chondroma; central epiphyseal myxochondroma; central myxochondroma with productive osteitis; pe-

ripheral chondroma with mucoid degeneration; myxochondroma of low grade malignancy; central chondrosarcoma; peripheral chondrosarcoma. These cases step gradually from innocent new growths to the gravely malignant.

The rate of growth of the tumor is of clinical value only in exceptional cases. No cartilaginous tumor of long standing has been malignant throughout the whole of its course. However, malignant transformation of a benign tumor may occur at any time. A tumor which increases in size very slowly or which remains stationary is at worst only mildly malignant or "border-line." It is generally accepted that the capsule surrounding a slowly growing neoplasm is the product of the environment. Fibrous tissue is therefore necessary in the environment to the formation of a capsule. In the case of a benign periosteal bone tumor growing peripherally, the periosteum together with the surrounding fibrous tissue will aid in forming a capsule. In the interior of the bone, however, and at the bony margin of peripherally located tumors no fibrous tissue capsule can form to wall off the tumor since the normal response of bone to slow irritation is the production of giant cells and young granulations but not fibrous tissue. If the surgeon finds a definite external capsule inclosing a cartilage tumor he may safely conclude that it is relatively benign even though he does not find the inner portion of growth sharply delimited. Within the bone, whether the tumor be benign or not the surgeon cannot distinguish with the naked eye the intra-osseous limits of growth. Having no capsule to guide him, he must remove some apparently healthy bone lest he leave some that is infiltrated.

The vascularity of the tissue of the tumor is an aid in diagnosis. If the cartilaginous material is white and does not bleed freely it is probably not sarcomatous. In malignant cases the whole structure of the tumor is colored by numerous small vessels. The dense hyaline tumor resembling articular cartilage is easily recognized as benign but few chondromas resemble thus closely the normal structure. Mucoid degeneration with cyst formation and true myxoma do not of themselves indicate malignancy. If a tumor infiltrates the surrounding tissues and presents other evidence of malignancy the fact that the cartilage forming it is of firm consistency must not be taken as proof of innocent growth. Microscopic proof of malignancy of this series of cartilaginous tumors has been furnished only by the demonstration of atypical mitosis or the products of such mitosis. True myxomatous tissue is demonstrable in tumors clinically proved to be benign. Frequently, careful search through different parts of the tumor will reveal widely different histological features. When a tumor of apparently pure myxomatous tissue produces metastasis such metastasis is attributable to other elements in the tumor than fully differentiated mucous connective tissue cells. Similarly groups of undifferentiated cells without atypical mitosis have been considered suspicious, although such cells were found in a tumor with a long, relatively benign clinical course.

KOLTA, ERWIN. The effect of roentgen rays upon hyperacidity. *Strahlentherapie*, 1924, xviii, 589–592.

The action of radiation upon the parotid and sweat glands is more or less understood but its effect upon the gastric glands remains undetermined. Observations agree that a decreased secretion occurs in the parotid and sweat glands but there is no agreement on the effect in the stomach.

Results are reported upon 30 cases of hyperacidity in patients who gave no evidence either clinically or roentgenologically of gastric ulcer. The treatment produced an influence in only 13 of the cases and the effect was not permanent. In only 6 cases was there a decrease of acidity lasting any length of time. Instead of a decrease in acidity there may occur an increase at once or following a temporary decrease. This occurred in 4 cases. It was also observed that an alteration in subjective and objective findings was not always parallel. One skin unit dose of roentgen rays was administered upon the gastric region through one field in front and two in back. The rays were administered through 0.4 mm. Cu plus 1 mm. Al, 25 cm. distance, portal 25 by 30 cm. One field was administered daily. In most cases a second series of irradiations was repeated after two weeks.

KROETZ, CH. The significance of physicochemical and chemical changes in the composition of the blood during roentgen irradiation. *Strahlentherapie*, 1924, xviii, 545–555.

Studies on the acid base equilibrium of the blood in irradiated man and animals (especially the dog) have demonstrated a very definite response to the radiation. There is an early and temporary acidosis followed by an alkalosis lasting several days. This is explained as follows: The early hypocapnia is not completely compensated for by a decrease in the carbon dioxide tension resulting in a temporary acidosis, which on the transition to hypercapnia with continued decrease in carbon

dioxide tension changes to a sustained alkalosis having its peak at the end of twenty-four hours.

The alterations in the water content were not uniform. In man, there usually appeared a certain amount of hydremia whereas in the animals there was a loss of water from the blood. The changes in concentration of protein and salts in the serum were prompt, definite and characteristic in man and animal. Regarding the protein it was experimentally demonstrated that under the action of roentgen rays the protein composition of the serum is affected probably by intramolecular alterations in the proteins and perhaps also through an inflow of protein from the tissues. The determinations of salt concentration demonstrated a uniform response to the roentgen rays. There was an increase in the absolute sodium content and a decrease in the absolute chlorine content. This change should be considered in relation to the two-phase alteration of the serum bicarbonate previously mentioned. The temporary acidosis at the beginning of the response to irradiation coincides with a maximum decrease of anion concentration due to the accumulation of acid protein compounds in the serum.

According to this explanation it would appear that the alterations in protein occur first as a result of irradiation. This effect should be exerted not only upon the protoplasm of the exposed tissues but also upon the minute blood volume of that zone. Consequently the terms "space dose" and "selective liver injury" take on a special significance.

The alterations in salt and bicarbonate concentration are reflected in the regulation of acid base equilibrium. It is pointed out that the respiratory center is a particularly sensitive zone for demonstrating such effects of radiation. The cells of the respiratory center are stimulated to an increased sensitiveness as a result of a change in reaction and alteration in the balance of certain ions, and the end-result is the prolonged alkalosis of the blood due to the roentgen rays. This explains the practical results obtained by injections of sodium chloride and calcium chloride in roentgen sickness. According to recent physiological investigations both the salts have a pronounced acidotic effect upon the blood reaction and injection of them tends to compensate for the radiation-alkalosis. The fact that definite therapeutic effect is obtained by injection of these acidotic salts indicates that the radiation-alkalosis plays an important rôle in the complex etiology of roentgen sickness.

LAHM, W. A new centering device for irradiation of deep carcinomas. *Strablentberapie*, 1924, xviii, 605–610.

The arrangement described has for its purpose the precise fixing of the center of the tumor mass followed by arrangement of the roentgen tube in suitable positions to converge the radiation cones upon the tumor without overlapping of fields.

The fixing of the position of the tumor mass within the body of the patient depends upon fairly close measurements of the distance of the tumor in three rectangular coordinates using the plane of the roentgen table as the base. The roentgen tube is fixed in a carrying frame which permits centering over the tumor and subsequent sliding of the roentgen tube along the arc of the circle having as its center the center of the tumor. In this manner a series of ports may be irradiated with the central rays all converging to the tumor mass within the body.

LUBOSCHEZ, B. E. On measuring and expressing *x*-ray quality in radiography. *Brit. J. Radiol.*, March, 1925, xxx, 81–89.

The readings on the Benoist and on the Wehnelt penetrometers and others that have so far been evolved are not very reliable guides as to quality of radiation. This is partly due to the fact that with most penetrometers in use it is difficult to say exactly when the shadows on the silver and aluminum are of the same intensity. This difficulty is to a large extent obviated in the Rzewuski penetrometer which has two wedges of aluminum arranged to slide over each other in front of the small window covered by a fluorescent screen. On each side of the wedges are arranged pieces of silver foil. This instrument has been used to compare penetrometer readings with the sphere gap voltmeter so as to determine approximately the wave lengths corresponding to the numbers on the penetrometer scales. A table is presented recording the various equivalent spark gaps, voltages, wave lengths and frequencies for soft, medium and hard rays. This table is tentative and intended for practical trial by roentgenographers.

LUDEWIG, P. The emanation content of the radioactive springs of Brambach and Oberschlema. *Strablentberapie*, 1924, xviii, 718–720.

The data reported are given in terms of Eman ($= 10^{-10}$ curie) per liter. The Brambach spring averaged about 7000 Eman and the Oberschlema varied from 7000 to 9000 over a

period of two years. It was demonstrated that the variations in the latter case were due to the drain upon the spring. Whenever the flow was great the emanation content was low and *vice versa*.

MacCarty, Wm. C. The early diagnosis of cancer. *Arch. Clin. Cancer Research, N. Y.*, January, 1925, i, 11–20.

To the many links in the chain of diagnosis, history, palpation, auscultation, roentgenology, and chemical tests should be added that specialty comprising the study of fresh tissues. The pathologist undertaking study and diagnosis of freshly excised tissue must learn that the cells of such tissues are very different structurally from those which have been dead for some time, fixed and embedded. They are larger, have perfectly regular outlines and do not show reticulated nucleoplasm and cytoplasm. Malignant cells are not irregular in shape as described in textbooks. They do not resemble adult tissue cells although they may sometimes resemble reparative regenerative cells of normal tissues; but even then there are differences which distinguish them.

In some instances a diagnosis may be made better clinically without the aid of a pathologist, but a broad experience indicates that a gross positive diagnosis may be physically impossible in from 10 to 20 per cent of the cases. A summary is given of the cases in which diagnosis was possible only by microscopic examination in a total of about 10,000 specimens of various sorts. In tissues from certain areas, as for instance the head, neck, stomach, trunk, and extremities, the need of the microscope for establishing the diagnosis was relatively great.

The diagnosis of frozen sections demands on the part of the pathologist an experience in the study of fresh living tissues, knowledge of the difference between dead and living cells, of artefacts coincident to death, fixation and embedding, the morphology of living cells, the detailed morphology of at least 45 different differentiated cells in the normal human body, of all regenerative forms of cells for all tissues, of the stages of differentiation of cells in the normal evolution of normal adult tissues, and of relative sizes of unfixed cells based upon actual measurements. He should make a comparative study of the morphology of neoplastic cells, reparative regenerative cells and adult cells. He should know the structure and relationship of tissues and of cytologic pictures in relation to the welfare of the host. And not the least important of his duties should be access to all clinical data and first-hand visualization of conditions during operation.

Miescher, G. Studies on the appearance of growth acceleration following radium irradiation of a hyphomycete pathogenic to man. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 81–84.

In one series of experiments making use of *Trichophyton gypseum* grown from inoculated spores upon maltose agar, no effect whatever could be observed in the appearance of the growth while under the influence of radium radiation. The radium preparation consisted of 1 mg. element inclosed in a glass tube. In the various experiments the radium was distant 8 cm. down to close contact with the growth. In another series of experiments of a similar nature, the radium preparation consisted of 24.9 mg. element filtered through 0.1 mm. Ag, held 10 cm. and 3 cm. from the surface of the growth. Even this irradiation with powerful beta rays caused no difference in growth from that observed in control tubes.

In another experiment the culture was grown in a small Erlenmeyer flask with the beta ray source 15 mm. above the surface of the culture. The culture was first allowed to attain full growth and production of spores, and the radium was then put in place. From this flask inoculations were made into culture tubes at regular intervals. Suitable controls were carried through. For two days after beginning of irradiation the growth resulting in the transplants could not be distinguished from control cultures. Cultures made from material irradiated three to six days showed a slight inhibition in growth which gradually caught up with the controls. After eight to ten days there was pronounced inhibition without compensating growth, and spores irradiated ten to fourteen days yielded no growth on transplantation.

At no time was there observed any growth-stimulating effect of the radium radiation despite different variations in experiment that might bring out this effect.

Pordes, Fritz. The concept of "stimulation" in roentgenology. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 84–87.

By "stimulation" is understood an alteration in condition of a living substance. It is therefore erroneous to term the effect of small stimulative quantities as "stimulant *per se*" as opposed to the effects of greater stimulative quantities. By direct stimulative effect of roentgen rays is understood an improvement in the activity of the cell involved. Since there is no such thing as an improvement in condition of optimally functioning cells it is assumed by those authors who deny such a direct stimulative effect of the

roentgen rays that we are dealing here not with stimulative action but rather with a biopathological acceleration or increase in function or growth. By an indirect stimulative effect is understood the improvement in cell activity from the standpoint of the organism produced by cessation of function or by breakdown products of other cells. In other words, the indirect effect takes place upon structures not exposed to the radiation. On the other hand, the direct stimulative action upon irradiated cells still remains undemonstrated and is improbable. Since the term indirect stimulation is often not clearly enough differentiated from direct stimulation it is confusing and should be abolished.

RISSE, OTTO, AND POOS, FRITZ. Roentgen irradiation and the vegetative nervous system. *Strablentherapie*, 1924, xviii, 556–563.

The effect of roentgen radiation upon the denervated eye of the rabbit was studied with all due precautions to avoid direct effect of electrical field upon the pupil, the influence of extraneous radiation, direct stimulation, drying, etc. Comparisons were made with the responses of normal controls. The quantity of radiation admitted varied from 15 to 120 *e*. It was discovered that pharmacologically active substances were liberated in the blood stream under suitable irradiation of the animal which made themselves evident by either a mydriasis or myosis. It is believed that one of these substances is most probably adrenalin, the effect of which upon the eye is screened and over-compensated by a flooding of a preformed or newly formed unknown substance having a pronounced action resembling that of physostigmin.

Another very striking observation was made which might have a therapeutic application. It was found in animals having a pronounced radiation-myosis even after many weeks (the longest observation being 80 days) that a maximum atropin mydriasis was neutralized in from six to ten hours; that is, complete light-sensitiveness of the pupil returned within a few hours, whereas the normal duration of the atropin effect was three to five days. Excessive irradiation appears to reverse this effect.

SILVERMAN, DANIEL N., and MENVILLE, LEON J. Observations of the visualized gall-bladder by Graham method. *J. Am. M. Ass.*, Feb. 7, 1925, lxxxiv, 416–418.

The primary purpose of this study was to determine whether or not the gall-bladder is altered by a non-surgical biliary drainage induced by magnesium sulphate placed in the duodenum according to the Lyon-Meltzer technique. The observations were made upon 2 cases which are reported and pictured in detail. The gall-bladder in each case was visualized by the aid of sodium tetrabromphenolphthalein injected intravenously. Particular care was taken to secure comparable roentgenograms before and after the magnesium sulphate treatment. A Potter-Bucky diaphragm was used to secure good detail.

It was found that a roentgenogram taken a few minutes after stimulation of the duodenum with magnesium sulphate showed a reduction in size and alteration in shape of the gall-bladder shadow. It seems clear from these cases that duodeno-biliary drainage following a single stimulation with magnesium sulphate solution produces a reduction in size and change in shape of the gall-bladder shadow when visualized by the Graham method. Plates taken at intervals up to twenty-four hours after injection of the dye but without drainage show no parallel change in shape or size of the shadow. Since non-surgical biliary drainage reduces the size and alters the shape of the gall-bladder it is reasonable to conclude that drainage of the gall-bladder actually has taken place.

SIRIS, IRVIN E. Elbow fractures and dislocations. *Surg., Gynec. & Obst.*, May, 1925, xl, 665–682.

A study was made of 181 consecutive cases of fracture and dislocation in the region of the elbow joint occurring in children under thirteen years of age, in the period June, 1919, to August, 1924. It was found that the treatment after reduction was more important than the initial reposition and fixation. The clinical course demonstrated that accurate anatomical approximation of the fragments was not absolutely essential for complete restoration of function; that a disfigured elbow resulting from persistent displacement might have a most useful function, while an anatomically restored elbow might be lacking in mobility unless judiciously treated.

Displacement and overriding of fragments will often result in a good functional limb and complete restoration of the bony contour. The best results are obtained by immediate reduction under an anesthetic with the aid of the roentgenoscope. Partial immobilization and early active motion will reduce swelling, increase muscular tonicity and prevent muscular spasm, exuberant callus, Volkmann's ischemic paralysis and myositis ossificans. Passive motion with or without an anesthetic and active massage retards progress. Musculospiral and ulnar paralysis accompanying and

following fractures about the elbow is not always permanent. Myositis ossificans will disappear with the discontinuation of trauma to the brachialis anticus. Compound fractures are best treated by débridement, Carrel-Dakin sterilization, suspension in flexion by adhesive or in a fixed Thomas splint, to be followed by secondary suture or granulation with the institution of early active motion.

Children have excellent reparative powers in fractures; consequently open operations in children are not indicated, as good functional limbs will follow displaced fragments whereas infections are very prone to follow open operations.

TRENDELENBURG, W. Regarding adaptation spectacles. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, February, 1925, xxxiii, 87–90.

From considerations of physiological optics it has been demonstrated that pure red glasses for use in adaptation spectacles is probably the best in that this color permits the passage of light, allowing vision in bright light and at the same time absorbs that portion of bright light which interferes with the adjustment of the dark adaptation.

It has recently come to the attention of the author that certain types of adaptation spectacles on the market are not of red colored glass. In one case the color of the glass was green and in another case, blue. From the mere theoretical standpoint such glasses are entirely useless for purposes of the roentgen-ray laboratory. Tests were made of the speed of adaptation in dark and the light with and without the spectacles in question. Using the speed of adaptation as the criterion it was found that adaptation was fastest with the red glass, and relatively much slower or impossible with the green and the blue glasses.

VORLAENDER, K. Biological experiments on the effect of irradiation upon carcinoma. V. *Strahlentherapie*, 1924, xviii, 564–572.

Numerous tissue sections were studied in an effort to determine the histological features to be found in transplantable mouse tumors of irradiated and non-irradiated animals. Previous reports had shown that a "prophylactic" roentgen irradiation (*225 e*) caused a definite regression in tumor implanted several days after the general irradiation. Histological study of the tissues of the tumor section from such animals paralleled in a striking manner the gross observations of regression of the mass. It is pointed out that a certain small percentage of such tumors failed to show such regression, and furthermore that under certain conditions inoculated animals not subjected to irradiation also presented the identical pictue of tumor regression.

It must be concluded, therefore, that the tissues of the normal animal must possess a certain defensive power which normally is relatively low, which on occasions is fairly strong in normal animals and which very frequently is strengthened by a "prophylactic" roentgen irradiation. The typical histological picture of tumor regression was found in tumor-bearing animals irradiated after the neoplasm had established growth.

The histological picture following a favorable tissue reaction consisted in a connective tissue reaction with the presence of fibrocytes, fibroblasts and histiocytes. The tumor cells showed progressively, a decrease in mitosis, disappearance of mitosis, nuclear swelling, syncytium formation, vacuolar degeneration, karyolysis karyorrhexis, and finally complete necrosis. It is not denied that the roentgen rays exert a direct lethal effect upon the tumor cells, but the point is emphasized that there is latent in the normal animal a defense mechanism that is stimulated by the radiation.

VOORHEES, IRVING W. The importance of early recognition of cancer of the larynx. *Arch. Clin. Cancer Research, N. Y.*, January, 1925, i, 21–30.

The points summarized in this discussion of the early signs of cancer of the larynx are as follows: The prodromal symptoms are similar to those of chronic laryngitis—frequent attacks of hoarseness, occasional smarting or burning in the throat, feeling of a lump or object which cannot be removed. Late symptoms include pain in the throat and difficulty in swallowing. When the glands of the neck are involved the symptoms are termed "too late."

Cancer of the larynx is slow and insidious in onset and protracted in its course. There is little or no tendency to metastasize. Any tiny tumor or growth associated with change in color of the mucous membrane and limitation of motion of the vocal cord is very suggestive of malignancy. It appears that a considerable number of patients while probably still in an operable stage had not been carefully examined, and were assured the condition was trifling by the general practitioners whom they had consulted.